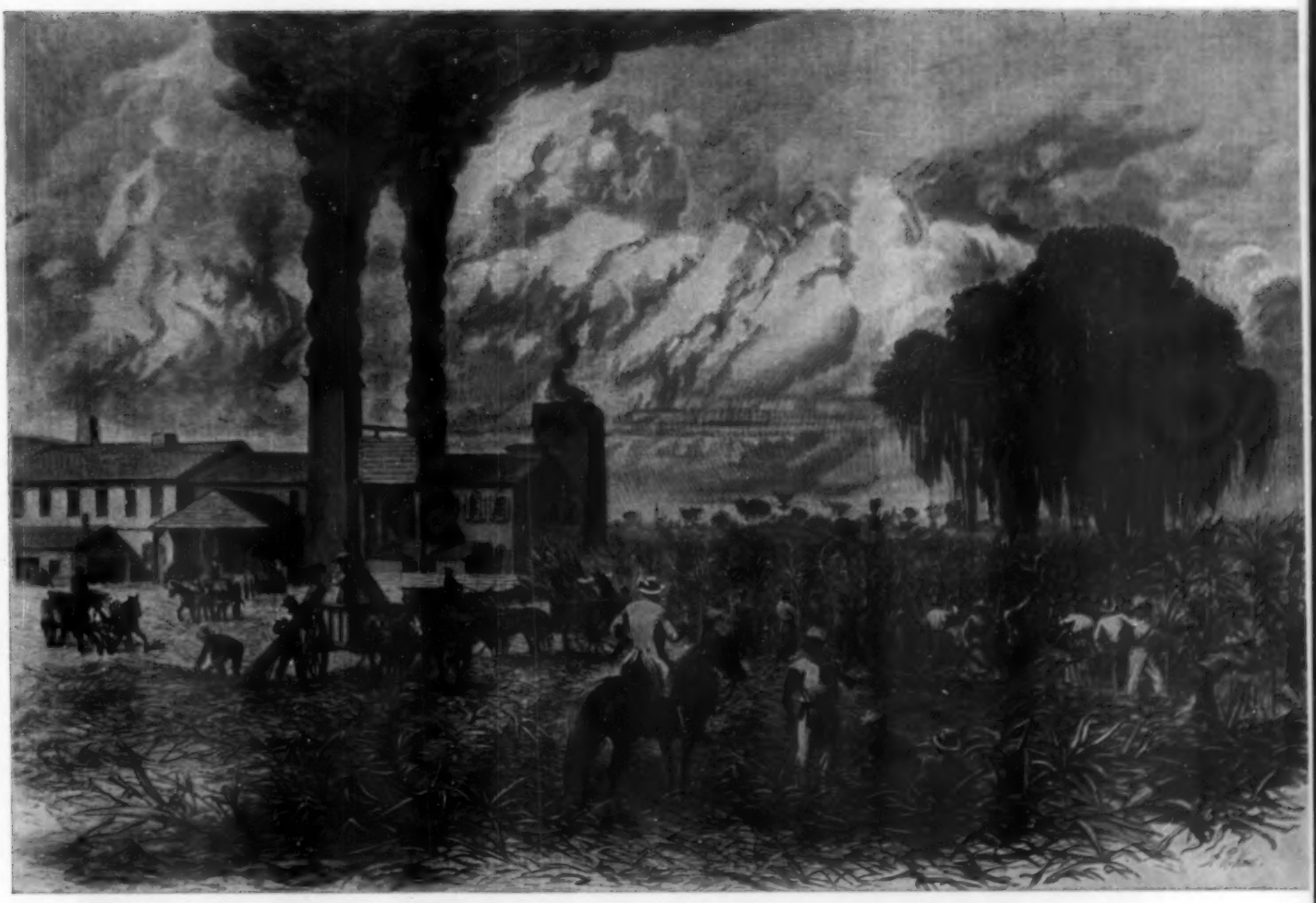

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OCTOBER 1960

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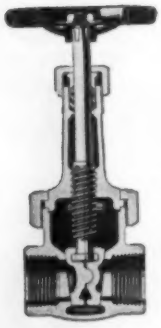

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Sugar y Azucar for October, 1960, Volume 55, No. 10. Published monthly by Russell Palmer Trust, Mona Palmer, Publisher. Publication Office, 109 Market Pl., Baltimore, Md. Editorial and executive office, 404 Fifth Avenue, New York 20, N. Y. Accepted as controlled circulation publication at Baltimore, Md.

SUGAR y AZUCAR

Volume 55 No. 10 October 1960

CONTENTS

New Field Mechanization Section 4
European News & Notes 8
First Beet Campaign in Pakistan 33
Colonial Sugar Building Plant Research Center 35
Increasing Existing Mill Capacity 36
Sugar Dispute in Fiji Threatens Colony Economy 38
Human Relations 39
Facts About Sugar 40
Sugar Abstracts 44
Eliminating Discoloration In Portuguese East Africa 49

CONTENIDO

51 Primera Compaña Remolachera en Pakistan
53 Construye la Colonial Sugar un Centro de Investigación Agricola
54 Como Aumentar la Capacidad de los Molinos
58 Eliminación de la Descolorización en el Africa Oriental Portuguesa
60 Disputa Sobre Azucar en Fiji Amenaza la Economía de la Colonia
80 Extractos de Publicaciones Azucareras

COVER *The picturesque scene of cane harvesting and processing in Louisiana in the early 19th century is reproduced on this month's front cover from a fine old engraving furnished through the courtesy of Jacques H. Villard of 175 Fifth Avenue, New York 10, N. Y. Mr. Villard, a dealer in fine prints, has an exceptional collection of scenes from the sugar industry covering the 16th to the 19th centuries suitable for decorative or publicity purposes. A pamphlet illustrating a 16th century sugar mill is available on request.*

PORTADA *La pintoresca escena de la recolección y elaboración de la caña en Luisiana a principios del Siglo XIX se reproduce en la portada de este mes de un antiguo y bello grabado facilitado por cortesía de Jacques H. Villard, con residencia en el 175 de la Quinta Avenida, Nueva York 10, N. Y. El Sr. Villard, comerciante en grabados finos, tiene una colección excepcional de escenas de la industria azucarera que abarcan los Siglos XVI al XIX y que son apropriadas para decoración y publicidad. Un folleto ilustrando un ingenio del Siglo XVI está disponible a solicitud.*

Publisher, MONA PALMER
Editor, E. W. MAYO, JR.
Technical Editor, DR. O. W. WILLCOX
Editor, Spanish Section, MARIO A. MASCARÓ
Advertising Manager, R. E. SLIMERMEYER

NBP BPA

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EDITORIAL and EXECUTIVE OFFICE:
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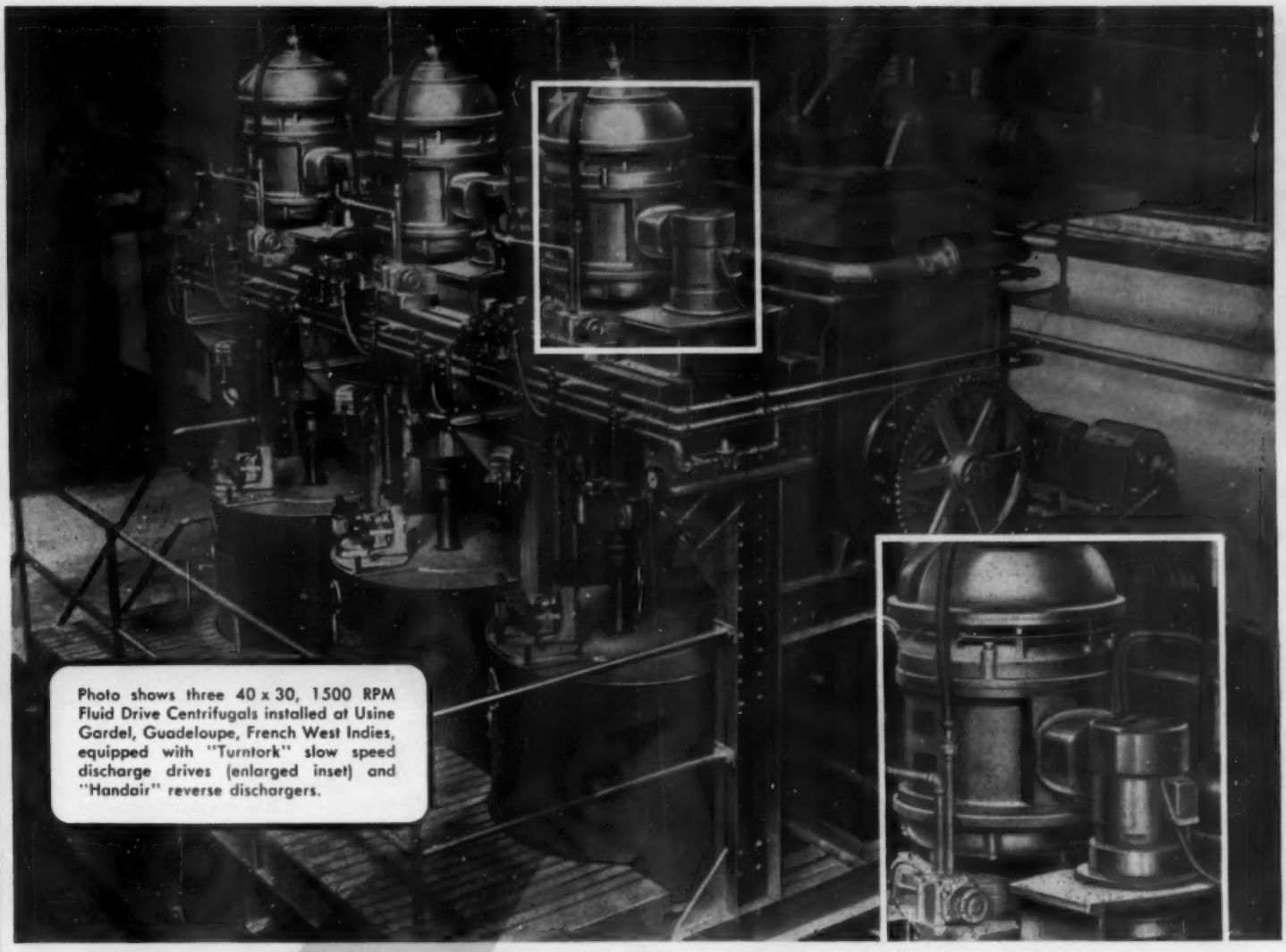

Photo shows three 40 x 30, 1500 RPM Fluid Drive Centrifugals installed at Usine Gardel, Guadeloupe, French West Indies, equipped with "Turntork" slow speed discharge drives (enlarged inset) and "Handair" reverse dischargers.

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2661

NEW FIELD MECHANIZATION SECTION

THIS is the first issue of a new section which Sugar y Azucar hopes to make a continuing feature starting next year. For years, the crushing plant and boiling house have been given major attention in the cane sugar industry. Now, with increasing labor cost and more competitive conditions, many sugar managers realize that greater savings may come through improved field techniques and equipment than in the milling operation.

Hawaii, for example, has found that they are losing an estimated U.S. $22 million worth of sugar between that grown in the fields and that finally manufactured. Of this total, $13 million is attributed to field losses and $9 million to milling losses. So any attempt to reduce costs, must logically give serious attention to field mechanization.

Mechanization of farming began over 100 years ago with the development of the steam plow by John Fowler, an Englishman. At that time, it took a farmer using animal-drawn hand tools about 60 hours to cultivate one acre. With a tractor, it takes only one-twentieth of the time.

SUGAR Y AZUCAR is the first international sugar publication to focus major attention on field mechanization. It is our purpose to provide a forum for researchers, sugar companies and manufacturers to tell their story. This provides our readers with a comprehensive review of new equipment and new practices on a world-wide basis.

Custom Harvesting In Australia

A commercial harvesting company has been formed in the Herbert River District of Australia to harvest cane this year. This is believed to be the first such commercial operation in the sugar world, despite the fact that it is a cooperative venture.

The Herbert River District has had a continual shortage of hand cutters for several years. This created more than normal interest in mechanical harvesting.

Last year, growers set up an active research project to test the Massey-Ferguson harvester. A full-time team of two men from the executive staff of the growers' association were engaged in the testing operation.

Harvesting was done under contract. All wages and running costs were paid by the growers' association, and reimbursed at average cutting rates by the farmers involved.

This year, the program moves a step forward with organization of the harvester company. Two Massey-Ferguson machines with trailers and bins, and a Venton cane harvester, will be purchased.

New Mechanical Equipment

A small engine-powered cultivating machine which does rotary tilling and more than 20 other jobs in agriculture has recently been tested in Australia. It is made by a British manufacturer.

The machine uses a 4½ h.p. air cooled two-stroke engine. It could not be stalled in even the heaviest going, says a report of the Australian Scientific International Advisory Council, following 150 hours of operation.

The Colonial Sugar Refining Co., largest corporation in Australia, hopes to proceed with development of a two-row cane cutter-bundler. The project was started in 1958. So far, trials have shown that it will top, ground-cut, convey and bundle complete stalks for mechanical loading. The topping range lies between 4 ft. 9 in. and 9 ft. Bundles are from 400 to 700 pounds.

Cane harvesting equipment manufactured by J & L Engineering Company of Louisiana is operating successfully in Louisiana, Mexico, Puerto Rico and elsewhere. An economical unit designed for mounting on Caterpillar D-4 and International TD 9 crawler tractors is said to have operated efficiently. A similar harvester can be mounted on wheel type tractors and, using four row piling arms, heaps from three to eight rows.

Machinery Operation Training

Labor is cheap in Africa, but Professor J. A. Vorster of the University of Pretoria, says that depreciation is 40 per cent greater on tractors driven by natives than those driven by qualified Europeans. This is the depreciation only, and does not include the loss in time and money through inefficient operation.

Professor Vorster prepared an excellent article which appeared in a recent issue of *South Africa Sugar Journal* on mechanization.

One of his observations is that mechanization takes about 50 per cent of the entire cost of production, while seed and fertilizer are about 25 per cent. He added that one means of lowering the cost of production is to make mechanization more efficient.

He cited a specific case at the Illovo Sugar Estates which have embarked on a scheme whereby all natives employed for skilled or unskilled jobs receive a period of instruction in the correct way of doing their work. The company has established a special training department to carry out this project, following the success of a pilot program set up to train tractor operators and irrigation equipment handlers.

Illovo company officials say that the time and money spent in organizing the courses have been justified many times over by the drop in repair bills and increase in efficiency of labor.

New Cane Harvester In Hawaii

Probably the newest cane harvester in the sugar world is that designed by the Experiment Station, Hawaiian Sugar Planters' Assn. It has been tagged No. 29, as it is the 29th harvester to be designed in the Hawaiian industry since 1906.

R. A. Duncan, chief engineer of the Experiment Station, reports preliminary results are favorable and development is continuing. It has been field-tested at Oahu Sugar Co. but modifications now underway will keep the machine out of the field until 1961.

The new harvester is a cut-load machine. It cuts stalks at ground level, picks them up, chops them into 18-inch lengths, then conveys cane pieces to a trailer pulled alongside by an infield prime mover.

No official information is available on the machine, however, it is said that the machine is substantially lighter in weight than previous HSPA machines, and a production model will probably cost about $40,000. This is one-third the cost of existing cut-load machines used in Hawaii.

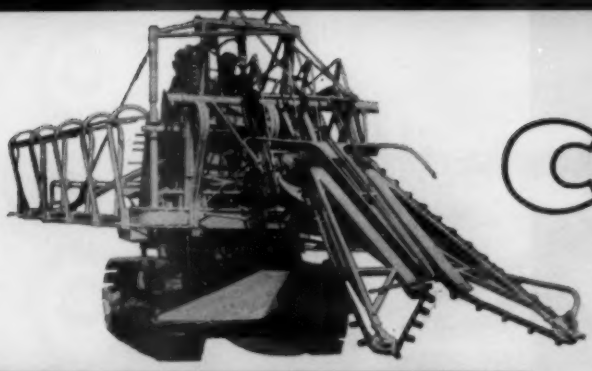
If these facts are borne out, Hawaii may have a machine that will be competitive in the growing cane harvester market.

Basic Principles of Field Mechanization

At least three basic principles of mechanization must be observed, if profitable use is made of equipment in the production of sugar, say authorities in the field.

1. Operating efficiency must be kept close to theoretical capacity.
2. Operator's skill must be maintained.
3. A preventive maintenance program must be carried out.

Each piece of equipment has a "theoretical capacity" and a true "operating efficiency." For example, a truck-tractor is capable of hauling 20 tons of gross cane, loaded on a semi-trailer, at a speed of 30 miles an hour. In practice, however, the truck must wait 15 minutes for loading in the field and 15 minutes for unloading at the mill. Suppose the theoretical capacity calls for the round trip to be made to and from the mill in 30 minutes—but another 30 minutes is required. Operating efficiency is, therefore, just 50 per cent.



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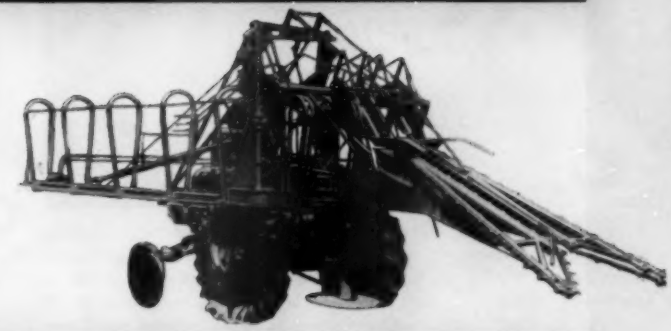

Mountable on a wide selection of cane field tractors. Four row piling arms permit heaps from 3 to 8 rows.

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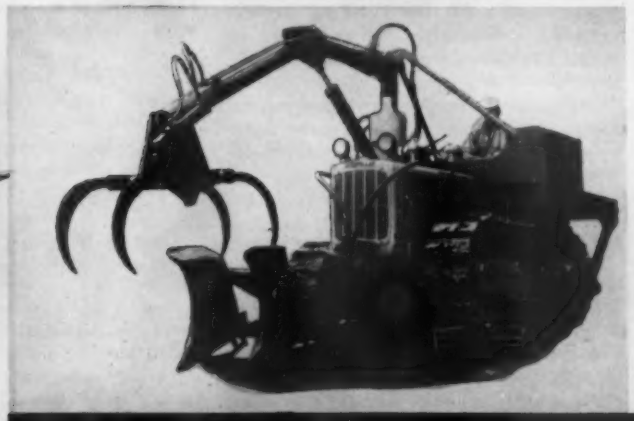

Crawler loader especially designed for Caterpillar D-4 tractors, employs patented stabilizer system that permits mounting on 4 or 5 roller oscillating track frames. No modifications to the tractor are necessary.

Large and Medium capacity loaders are available for mounting on most popular wheel and crawler model cane field tractors.

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Similar calculations can be made on any type of field operation including, plowing, harrowing, etc. In some cases standards have been established. For example, studies in the United States and Canada show that the operating efficiency of most tillage work, such a plowing, discing and harrowing, range between 75 and 90 per cent of theoretical capacity.

Equipment efficiency can be lost due to lack of proper field planning. Where fields are odd-shaped with numerous short rows, there will be additional turning time. Badly designed and poorly maintained roads require longer hauling time.

Lack of operator skill is probably the greatest single factor resulting in low operating efficiency. In theory, the operator should be able to keep his machine or implement properly maintained and adjusted and operating, so as to spend as little time on field repairs and adjustments as possible. He should be sufficiently skilled to avoid time losses such as overlapping between passes in discing and unproductive turnaround and travel time. He should have an appreciation of the job he is doing and the manner in which his equipment performs.

Riding the clutch, clashing the gears and reving the engine, are all bad habits which result in time-consuming break-downs and costly repairs.

Preventative maintenance is the heart of efficient and economical machine operation. Practically every manufacturer in the world makes available a manual telling the necessary steps to be taken in inspection and minor repair work that will keep the unit operating satisfactorily. There should be proper lubrication, proper cooling and clean, fuel, oil and air.

Savings from proper preventive maintenance, plus operator skill and maintenance of operating efficiency, will do much to solve losses in the sugar cane industry.

Planning for Mechanical Operations

There is a big difference between planning for hand operations and mechanical handling of field operations in sugar cane fields. Many failures result because sugar managers do not understand that mechanical operation requires a complete redesign of plots, roads, irrigation methods—and everything that goes into the field plan. In only the most rare cases can machines be used efficiently in areas that have been initially used for hand operations.

Small plots, and odd size patches of land which allow only short runs for equipment must be eliminated. It is impractical to let machinery negotiate drainage ditches and maneuver around telephone poles. Equipment for field mechanization is expensive. The ground must be planned for use of machines. Long straight runs must be possible, with a minimum of turning.

Some cane farmers will not be able to rearrange their land to allow successful mechanical operation. Some land must be dropped from practically every area to make efficient use of machinery. But, this dropping of acreage and replanning for use of equipment, is the only solution to successful field mechanization.

World's largest plowing harrow, weighing more than eight tons with 50-inch diameter discs, plows in decomposed cane trash in Hawaii. With maximum penetration of 18 inches the plow is manufactured by Rome Plow Co., drawn by a D-8H Caterpillar tractor.

Nine Years of Mechanical Harvesting

Mechanical harvesting of sugar cane is often considered something that will happen in the future. But, W. Truscott and his two sons who grow cane on their farm near Bundaberg, Australia, have been mechanically harvesting for nine years. A total of 13,965 tons of cane have been cut from 436 acres.

In 1951, they purchased an original Parry harvester. Mr. Parry is now a harvesting engineer with Fairymead Sugar Co., Ltd., near Bundaberg.

In 1953, the harvester was modified to drop the cut cane in bundles, parallel with the row being cut. This allowed mechanical loading by a grab-type Parry loader.

Prior to the 1959 season, Truscott and Sons achieved their greatest success with two additions to the machine. This includes a bundler and a conveyor system which delivers the cane into the bundler. The 500-pound bundles are dropped so they lay at right angles to the row, and suitable for loading with front-end loaders.

Long experience with problems of mechanical harvesting makes the Truscotts cautious in making claims for their machine, according to a story which appeared in the *Australian Producer's Review*. They point out that on irrigated property they grow straight cane suitable for mechanical harvesting, and rarely face the problem of sprawling or down cane. But, on occasions they do have to cut by hand to get the crop off.

For straight standing cane, the Truscotts say the machine in the present form is very effective and efficient. However, they admit that until a satisfactory down cane pick-up is devised the market for such harvesters is insufficient to justify large scale commercial production of the machine.

Eleven Harvesters In Australia

Eleven Massey-Ferguson cane harvesters are working in Australian cane fields this year, according to the company's chief engineer, J. K. Gaunt.

The machines are installed at seven locations. Six of the harvesters are privately owned, four were purchased by mills' and cane growers' associations and one is on loan to the Mackay mechanical harvesting committee.

No average output figures are available for the 11 machines as yet, however, one of the privately owned machines is reported to have harvested 51 tons between 7:00 A.M. and 10:30 A.M.—with a 97 per cent clean cane.

Mr. Gaunt says that he is confident that cane can be mechanically harvested for from 10 to 12 Australian shillings (about U.S. $2.00 to $2.20) a ton, including labor and other costs.

New Cane Loading Equipment

A new development in a mechanical cane loader has been announced by Toft Bros. of Bundaberg, Australia.

This is a hydraulic grab type unit which can be fitted to the rear of a crawler-type tractor. The boom has an 18-foot swinging radius from the center position and rotates through 360 degrees.

The unit has a pickup capacity of about 800 pounds.

The loader is especially designed for use on sloping fields, which have been a problem for mechanical loading in the past.

BROUSSARD *flex-boom* CANE LOADERS

Model FB-20 heavy duty tropical type loader mounted on Caterpillar D-4, with Push Piler

ADVANTAGES:

- **Extreme Simplicity**
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- **Flex-Boom for Fuller Faster Loading**
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The Broussard Loader may be easily installed at the destination on many types of wheel or crawler tractors already in hand, and quickly removed at the close of the harvest to permit normal use of tractor. Brief data: capacity 2000 lb/minute (under Louisiana conditions); grab 54″ opening, capacity 1500#; load clearance 12′; loading radius 10′ to 12′; boom swing front to right 100°.

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EUROPEAN

News & Notes

By our London Correspondent

BRITISH Sugar Technologists have expressed great pleasure and interest in the news that the suggestion made at the last biennial meeting of the American Society of Sugar Beet Technologists is bearing fruit. This was that a joint meeting would be welcomed with the Institut International de Recherches Betteravieres—possibly in England in 1961.

It is now learned that the 15th Summer Meeting of the IIRB will be held in East Anglia, Britain's main sugar beet area, on May 15 to 18 (inclusive) next. The Ministry of Agriculture Sugar Beet Research and Education Committee have undertaken to arrange this meeting, and a subcommittee under the chairmanship of Oswald S. Rose—retiring IIRB president and agricultural development officer of the British Sugar Corporation—has been set up to draw up the detailed programme.

This corporation has nine of its 18 sugar beet factories within easy reach in East Anglia and the meeting should therefore be an interesting and instructive one. Mr. Rose has expressed the hope to SUGAR Y AZUCAR that representatives of the American Sugar Beet Technologists will be able to attend.

Copies of the Proceedings of the IIRB's 22nd Winter Congress, comprising 28 papers and discussions in both English and French, are now available from the IIRB secretary, 144 Rue Victor Beauduin, Tirlemont, Brussels, price Belg. Frs. 250.

The 24th Winter Congress of the IIRB is also to be held in Brussels, on February 21 and 22 next. No details are yet available as the list of papers to be presented is only established in January. The chairman of this meeting will be R. Estetuelas, IIRB president.

SLIGHTLY lower imports of sugar and an increase in exports of home produce characterize the half-year's picture for the UK shown in Table I.

Table I—UK Imports and Exports of Sugar

Quantity in 1,000 long-tons and Value

	Jan.-June 1960	Jan.-June 1959
Imports:		
Sugar, unrefined	1,175 (£37.88m)	1,249 (£39.76m)
Sugar, refined (a)	28 (£1.04m)	59 (£2.03m)
Total sugar and sugar preparations	no data (£41.46m)	no data (£44.73m)
Exports:		
Sugar, refined	257 (£9.82m)	253 (£9.71m)
Total sugar and sugar preparations	298 (£13.94m)	278 (£13.44m)

(a) Including candy

SEVERAL important capital issues for sugar development have been announced in London recently. Up to £3½ million is to be raised by Sir J. L. Hulett and Sons Ltd., sugar planters and refiners, by a debenture issue to be used to finance sugar production in Southern Rhodesia. Although the proposal is subject to shareholders' approval, there appears no doubt the money will be forthcoming as the chairman announces he has secured promises of adequate support by private subscription.

The company's subsidiary—Triangle Ltd.—is committed under an agreement in 1958 to continue and to expand the growing of sugar cane and the production of sugar on its estate in Southern Rhodesia. This agreement gives Triangle certain water rights when the Kyle dam and canal are built and imposes on the company the obligation to use the water for growing sugar cane. With the approaching completion of these projects, and thus of the carrying out of its obligations, further large-scale development of the estate becomes necessary, including the erection of a sugar mill of large capacity.

Another British company which has recently announced an appreciable capital expenditure programme is Sena Sugar Estates Ltd. Referring to the large sums now being spent on capital account, its chairman—Lieut. Col. C. B. R. Hornung—said it was estimated that total expenditure for the year 1960 will be £700,000, to increase production further and to improve the amenities of its employees of all races.

The company's authorized capital was recently increased from £2.5 to £3.6 million and the board has purchased the outstanding share capital of Soc. Industrial do Ultramar (SIDUL), the company which operates Sena's Lisbon (Portugal) refinery under lease. Sidul has thus become a wholly-owned subsidiary.

The parent company's sugar output was 114,087 tons in 1959 against 99,203 tons in 1958. This was above expectation and was due to an appreciable improvement in the sugar content of the cane, the actual quantity of sugar cane crushed in both years being practically identical.

On January 1 last, The United Molasses group had capital expenditure commitments estimated at £210,000 quite apart from the £4½ million estimated cost of four new ships for which building contracts have been arranged. The fleet actually totalled near-

(*Continued on page* 10)

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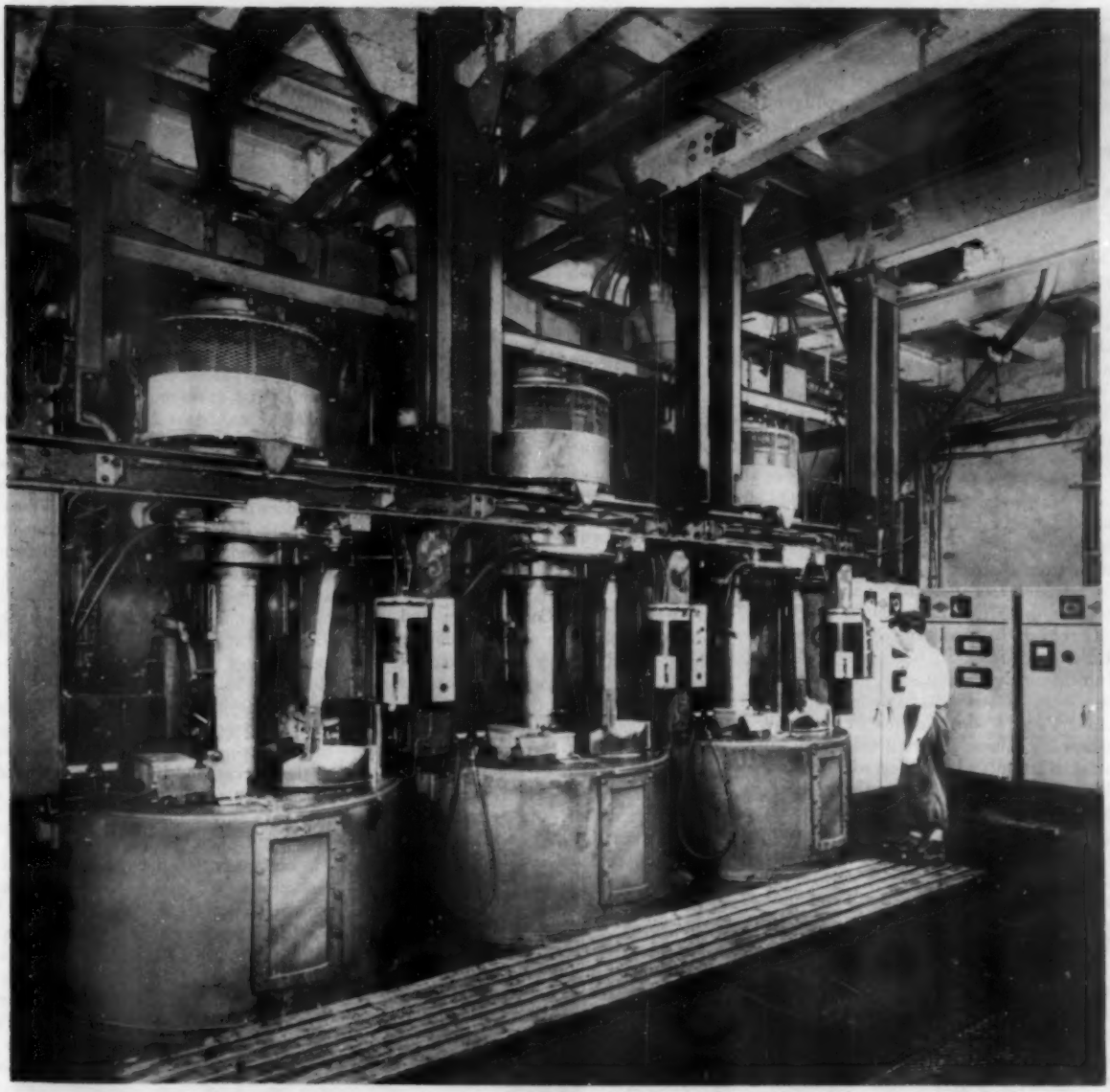

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ly 200,000 d.w.t. in May, with 58,700 d.w.t. commissioned and building.

The group's accounts for 1959, published recently, are so largely influenced by tanker freight rates that its results are really no true barometer of the sugar industry. Yet despite depressed shipowning conditions, net results are reported somewhat better than the outlook earlier, with gross profits only falling from £5.1 million to £4.8 million.

The chairman—G. W. Scott, CBE—reports that the new Belfast storage installation came into operation last September and, as a further stage in improving storage and handling facilities, a new installation at Manchester should be in operation toward the end of the year.

The six bulk carriers of the associated company, Sugar Lines Ltd., operated satisfactorily and were fully employed throughout 1959 but, due to the depressed level of the dry cargo market, earnings proved insufficient to cover full depreciation. In more recent months there has been an improvement in freights.

United Molasses' associated sugar companies are the West Indies Sugar Co. Ltd. and Caroni Ltd. The former, which operated estates in Jamaica, is reported to have had an extremely difficult year, largely occasioned through serious labour troubles in the island and a severe attack of West Indian cane fly. These factors greatly affected sugar production and, coupled with the low world prices prevailing during the year, resulted in the company sustaining a loss. Crop and labour conditions were more favorable for Caroni, and although profits were lower than in 1958 because of low world sugar prices, the results are considered most satisfactory.

The chairman reports that UK demand for molasses for animal feeding stuffs remained good throughout 1959 and is expected to increase again this year. For alcohol fermentation and solvent manufacture, however, demand continues low, despite reduced prices for molasses, owing to competition from synthetic plants. And the prospect of improvement remains poor.

Another interesting company development is the news that Westburn Sugar Refineries Ltd. and Lynedoch Investments Ltd. have submitted proposals to their shareholders under which Westburn offers to acquire the whole issued share capital of Lynedoch—by a share exchange on the basis of one ordinary share of 10s fully paid for every five shares of 2s each of Lynedoch.

"REPORT on the Census of Production for 1958 Sugar," published recently provides an authoritative estimate of the state of the UK industry as a whole at that time. It relates to establishments engaged in the manufacture or refining of sugar, syrup and treacle, molasses and invert sugar, and returns for 1958 were required only from the larger firms—those employing 25 or more persons; previously 11 or more was the dividing line. Of the seven tables, extracts from the opening one which follows gives an indication of the overall position.

UK Sugar Industry Summary

	1958	1954
Number of Enterprises	23	..
Number of Establishments	47	..
Sales £'000		
Goods produced and work done	202,081	188,247
Merchanted goods and canteen takings	1,852	..
Purchases of materials and fuels, £'000	145,155	142,779
Net output, £'000	16,998	19,929
Total number engaged	19,000	17,000
Capital expenditure, £'000		
Plant and machinery acquisitions	2,734	2,862
Vehicle acquisitions	226	114

"DOMESTIC Food Consumption and Expenditure: 1958," the annual report of the National Food Survey Committee of the Ministry of Agriculture Fisheries and Food, is published as the ninth of an annual series begun in 1950. Herein the sugar economist will find a mass of statistics on UK sugar consumption, including the habits of various-size households of a range of income groups, occupations, and geographical differences. Even the effect on household diet of the housewife going out to work is analyzed.

Under "changes in supplies moving into consumption" we find that the amount of sugar and syrups has been rising steadily over a number of years, representing 117.9 pounds per head per annum in 1958 against 116.1 pounds in 1957, 113.4 pounds in 1956 and 111.2 pounds in 1955. Prewar (1934 to 1938) the average was 104.6 pounds, so that the 1958 figure represents a rise of 13.3 pounds or 12.7%. The above averages include sugar in manufactured goods but excludes sugar used in brewing and distilling.

WILLIAM Boby & Co. Ltd. old established water treatment engineers of Rickmansworthy, Hert's, has received a contract to supply base exchange plants for the two sugar beet factories which Vickers and Bookers Ltd. are building in Russia at Brukhovetskij and Nikolaevskij. These will be fully automatic softening plants, each having 13,200 gal/hr capacity for supplying boiler feed make-up water.

It is also learned that the company has been asked to supply, and is now in the process of developing, an instrument for the detection of sucrose in condensate returns. This should be capable of detecting sucrose at concentrations of around 2 ppm, and thus it will have a general application in all plant processing sugar beet or cane. The instrument is expected to be available next year.

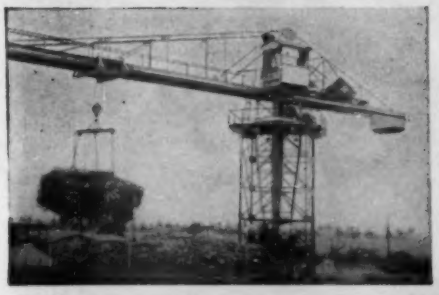
TO conclude on a different note, Sugar, a subject rarely finding mention in the national dailies, has been hitting the headlines of late with stories of price wars hotting up and retaliatory measures spreading.

In one town the local branch of a nationwide grocery firm has retaliated by offering to buy at 1s 3d all the 2-lb packets of granulated sugar its customers have bought at 1s 2d at a nearby cut-price shop, while in another area, where sugar was being sold at 11d for 2 lb, it offered to give away sugar with the purchase of over 10s worth of goods. The average price of this grade of sugar is quoted as 1s 3d to 1s 5d per 2-lb packet by the Consumers' Association.

Reports have appeared of increased UK imports of cube sugar from France selling at prices below regular levels, and the effects of these deliveries have been considerably exaggerated. Certainly a fresh element has reentered the picture after an absence since 1956: imports from France totalled 2,473 metric tons in 1959 against nil in 1958, and 936 tons in the first four months of this year against practically nil in the same period of 1958.

This development has led the "Financial Times" to comment that this introduces a breath of competition into the suppliers' end of the market, and if it can be extended into other types of sugar further cuts in retail price are surely to be expected.

A CONTRACT for the construction of four new beet sugar factories and the expansion of the capacity of an existing mill in Yugoslavia has been awarded to the Italian firms of Ansaldo San Giorgio, an affiliate of the Finmeccanica, and Nuove Reggiane. The new factories will be located at Sremska Mitrovica, Kovin, Pec and Senta. Two of the factories will have capacity to slice 2,000 tons of beets per day; the other two will have 1,500 tons capacity. The existing beet factory at Zupanja will be enlarged from its present 1,500 ton capacity to 3,000 tons per day. The contract for the beet factories was signed by Yugotecnica of Belgrade and includes two Yugoslav companies, Djuro Djakovic and Jedinstvo who will do a large part of the construction work. A broad program of technical assistance is included in the agreement which provides for the training of Yugoslav technicians at Ansaldo San Giorgio and Nuove Reggiane. Italian sugar technicians will be sent into Yugoslavia to supervise erection of the plants, help train workers, and start up the factories when completed. The Finmeccanica Group has supplied a considerable quantity of capital goods to Yugoslavia, last year having received the contract to construct a nitrogenous fertilizer plant at Lukavac which will be one of the largest in that country.



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— a vital link in the chain of sugar production

eliminating hold-ups in the movement of cane at the factory

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5-ton Tower Cranes.

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Use rugged LINK-BELT

900

class chain

for intermediate cane carrier service

You cut downtime to a minimum when you specify Link-Belt 900 Class chain for intermediate carrier service.

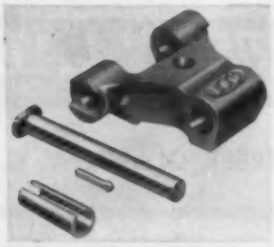
This durable chain stands up under the most grueling and corrosive carrier conditions. The special Link-Belt rib design gives additional link strength. Double sprockets contact outboard driving lugs—bagasse cannot jam in center pockets of links with this method of driving. Result: Longer, trouble-free operation . . . fewer conveyor shutdowns.

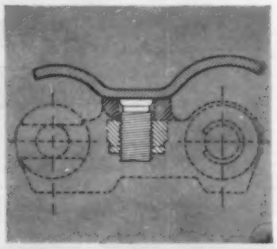
Link frames—available in malleable iron, Promal, bronze or stainless steel—can be furnished with pins and bushings of either carbon steel, bronze or stainless steel.

For complete information on Link-Belt chains and sprockets, contact your Link-Belt representative. Or write direct for Book 2640 containing full information on Link-Belt's complete line of sugar-handling equipment.

COMPONENTS are accurately made, carefully assembled. Wearing shoes at open end of link prevent tilting. Bushings are renewable, fit securely in barrel. Pins are firmly locked to prevent rotation in sidebar—cotter type assures easy assembly.

WELDED STUD SLATS eliminate slat hole elongation, prevent juice leakage and resist corrosion. Longer carrier life is assured because slats and chains are properly matched. Stainless steel self-locking nuts should be tightened with a torque wrench in assembly . . . disassembly is easy.





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"(The) desire for bargain prices has probably cost the sugar industry more money than any other single factor." *

SQUIER time-proven QUALITY assures LASTING ECONOMY

Buying sugar mill equipment involves intelligent, long-range thinking. The decision rests on much more than price alone.

The wise sugar man asks:

Will the equipment give me **maximum output?**

Will it be **dependable** — operate continuously without costly shut-downs?

Does the design facilitate routine maintenance with minimum down-time?

How about **service?** This is vital; is the factory staffed and equipped to insure top grade service?

The answers to all these questions **must** be "Yes". And you can be sure they **are** — if you buy Squier sugar machinery. Squier economy-based-on-quality has been proved over and over again during the last century and more.

When you think of sugar machinery — from a single unit to a complete tandem — think of Squier. Our field engineers will be glad to work with you. Phone or write them today.

* *From an editorial*

THE SQUIER CORP.

ENGINEERS AND MANUFACTURERS

BUFFALO, NEW YORK, U.S.A.

*the Best sugar mill drives run on Crofts!

SHAFT MOUNTED GEAR UNITS

Standard unit gives 5 to 425 r.p.m. output speeds and powers up to 120 hp.

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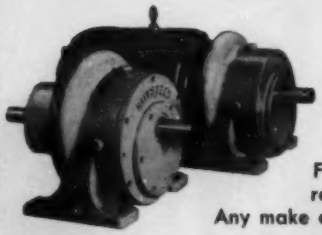

RITESPEED GEARED MOTORS

Fractional to 80 hp, ratios up to 82:1. Any make and type of motor.

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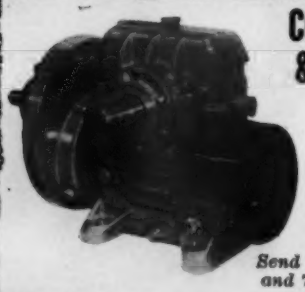

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2¼" to 14" centres in all types including worm geared motors fractional to 50 hp; ratios 300 to 30-1.

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MACHINE CUT GEARS

of all types. Spurs and helicals up to 185" diameter, 32" face width and 5" C.P.

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MULTISPEED 2-, 3- & 4 SPEED GEARED MOTORS

Fractional to 55 hp. with wide ranges of output speeds.

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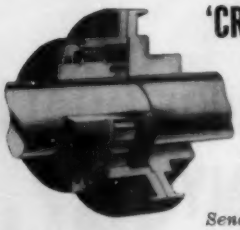

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Up to 1,000 hp, at 100 rpm from stock.

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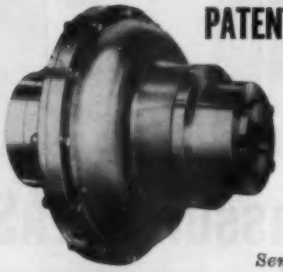

PATENT 'FREE-SPACE' HYDRAULIC COUPLINGS

Pully Type up to 350 hp at 875 rpm in 9 sizes, coupling type up to 350 hp at 875 rpm in 15 sizes.

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Treat with economical, flexible, easy to use DARCO. Your juice boils faster with less foaming, you get better spinning, better-handling massecuites, and you break bottlenecks when you refine with DARCO. Take advantage of Atlas' 35 years of activated carbon leadership!

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FAS-FLO* FILTERS

POSITIVELY REMOVE CANE MUD...

PRODUCE CRYSTAL CLEAR FILTRATE!

With FAS-FLO FILTERS, cane sugar producers can now efficiently eliminate cane mud and produce a filtrate so clear it's ready for evaporators. Two seasons of successful use in a new and modern Central American sugar factory have confirmed all the advantages of this revolutionary approach to mud filtration.

FAS-FLO FILTERS produce a juice so brilliantly clear there's no need to recirculate filtrate. This increases clarifier capacity and eliminates inversion losses. No other filter aids are required. No bagacillo is added, reducing sucrose loss in the cake. FAS-FLO FILTERS are easy to operate and require little maintenance. Filter cloths last longer; one set will last an entire crop.

Investigate these advantages yourself. Complete and mail the coupon below for information on direct pressure mud filtration and specific data on how FAS-FLO FILTERS can help you.

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76 BEAVER STREET, NEW YORK 5, NEW YORK
CABLE ADDRESS: "FASFLOFIL", N. Y.

*Reg. TM of FAS-FLO FILTER Corp., New York

Please send me report and summary of data covering FAS-FLO FILTERS use in cachaza filtration.

We grind _____ tons of cane per day.
We average _____ pounds of mud per ton of cane.

NAME _____
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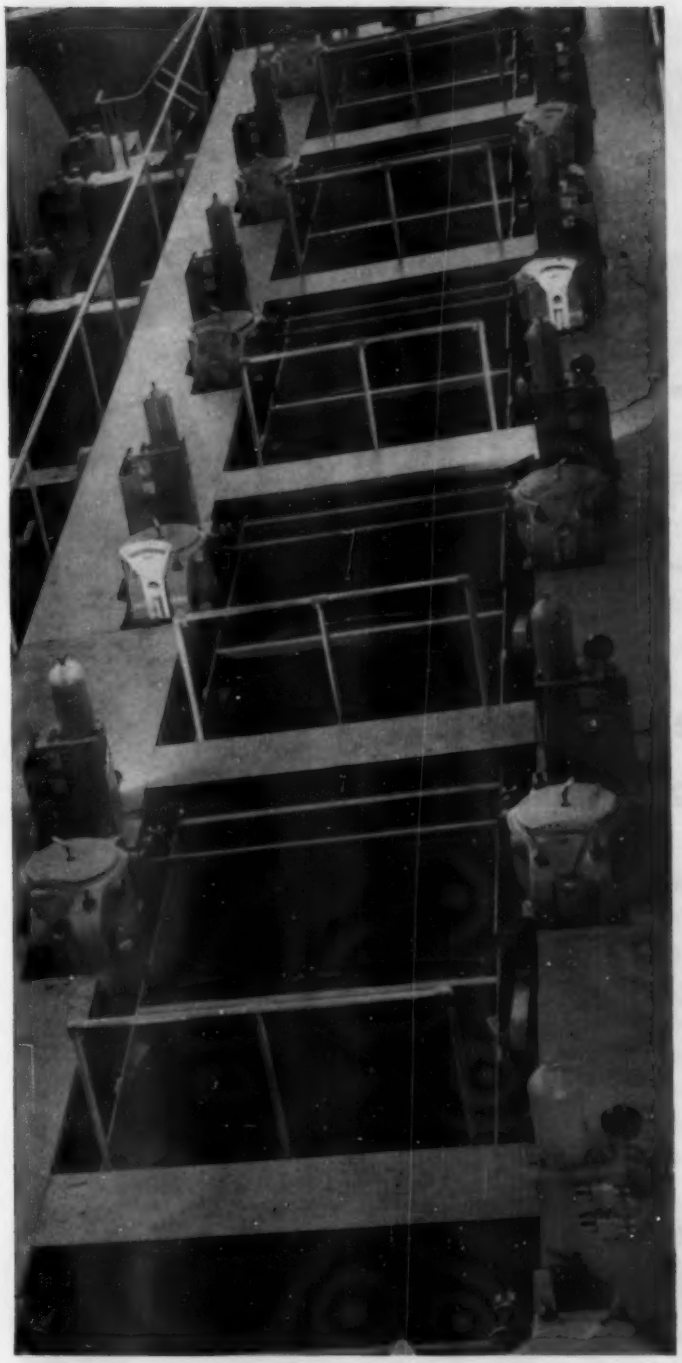
Why the rapidly increasing demand for Farrel sugar mills?



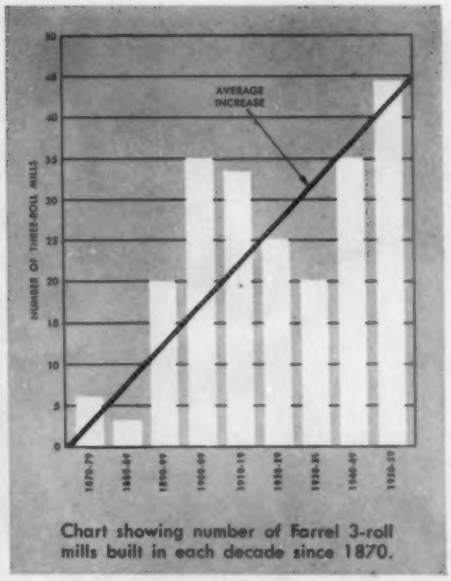


Chart showing number of Farrel 3-roll mills built in each decade since 1870.

Because, in recent years Farrel has pioneered a number of major refinements in sugar-grinding equipment.

For example, improvements in hydraulic ram mechanisms to maintain uniform roll pressure, and the introduction of force-feed rollers have resulted in increased sucrose extraction. Automatic lubrication of roll journals and centralized drive control for individual mills reduce costs for operating personnel.

New designs for side and top caps have been developed to permit fast, vertical removal of all rolls for regrooving and other maintenance. Time required for removal of hydraulic pistons and intermediate carriers has also been reduced.

Stronger housings and safeguards against corrosion add years to the life expectancy of mills. New hardened crownwheels, fabricated gears and rubber-belt carriers are establishing records for durability.

These are only a few of the recent innovations that have led to the increased demand for Farrel mills. For the full story, send for a copy of bulletin 312.

FARREL-BIRMINGHAM COMPANY, INC.
ANSONIA, CONNECTICUT, U.S.A.
Plants: Ansonia and Derby, Conn., Buffalo and Rochester, N.Y.

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The fine art of filtering with... EAGLE-PICHER Diatomite Filter Aids!

Tasteless, odorless Eagle-Picher Diatomite Filter Aids are available in standard grades for virtually all filtering jobs from water to beverages and antibiotics. Specific grades can be recommended on the basis of type and size of suspended material, viscosity of the liquid to be filtered, type of filtration equipment used and length of filtration cycles. There are Eagle-Picher Filter Aids "custom-made" to meet your required flow-rate and specific filtering objective. Our technical service engineers can help you find the right answer to your filtration problem. We welcome the opportunity to serve you and to share our diversified experience.

Since 1843 EAGLE EP PICHER

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DO YOU WANT...

More Sugar per ton of beets?

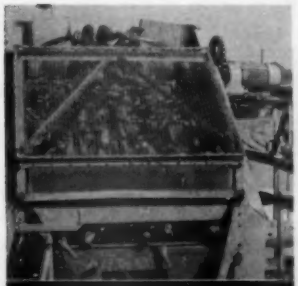
Lower Labor investments?

Fewer Grower complaints?

THE GRAB-ROLL SCREEN BUILDS A CLEAN PILE

—GIVES THE FARMER HIS OWN DIRT AND TRASH

Every one of these improvements is included in the list of benefits reported by buyers of the Silver Grab-Roll Screen for their best pilers. The elimination of refuse in the beet pile retards rot and growth, results in more sugar at the factory. The cleaner beets permit use of one flume (with one operator) where two had been required at a typical factory using Grab-Roll Screens exclusively. Because the grower can see and haul home his own dirt and trash, criticism of tare sampling is practically extinct for Silver Grab-Roll users.



A NEW GRAB-ROLL SCREEN AT HAMILTON CITY, CALIF.

Even if your present old-style screens are "working okay," we can show you the practical values to be gained by a change for the better. Let us show you how little this conversion really costs you.

CLEAN BEETS ARE EASIER TO FLUME

SILVER PILERS WORK BETTER, LONGER, CHEAPER

SILVER ENGINEERING WORKS, INC.

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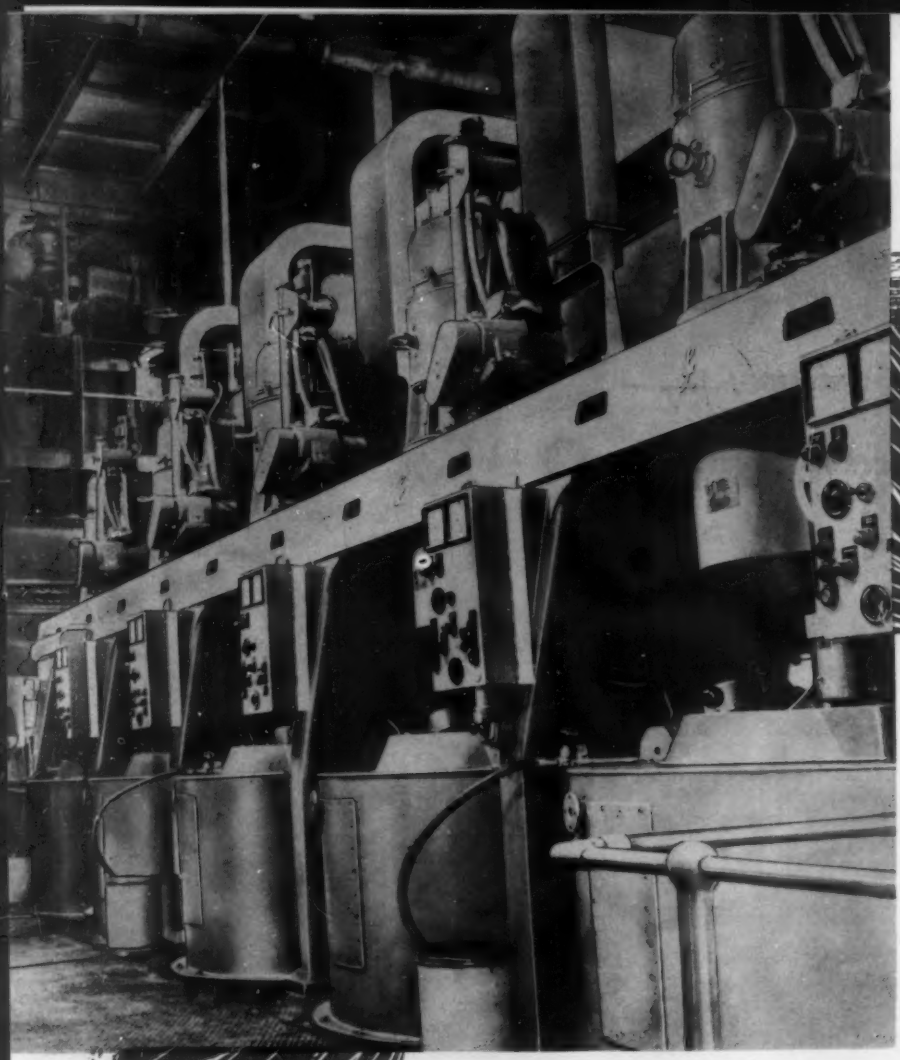
SUGAR MACHINERY FOR FIELD AND FACTORY



A battery of 6 48"x30" 1,300 r/m completely automatic centrifugals with Leonard Drive at The Millaquin Sugar Co., Bundaberg, Australia.

In beet and cane sugar factories and refineries there is always a tendency to modify processing in such a way as to obtain ever greater continuity. To carry this development a stage further, ASEA-Landsverk have brought out

The Fully Automatic Centrifugal

with Leonard Drive

This centrifugal offers the same advantages as the continuously-running, constant-speed machine with reference to low current consumption and low cost of attendance.

Its main features are

Stream-line Design
Variable Top and Charging Speeds
Entirely Electric Regenerative Braking
No Current Peaks
Pneumatically Operated Charging Mechanism
Motor-operated Unloader
Centralized Automatic Timing

Suitable for all kinds of Sugar

We are represented and have service facilities in most sugar producing countries.

For further information apply to the nearest ASEA office or direct to

ASEA

Västerås, Sweden

These two conversions are for a 29" x 54" 15-roll tandem, and are part of a modernization program to increase capacity and efficiency. This program included the installation of steam turbines and the modernization of the drives and bearings resulted in doubling the grinding capacity.

TWO MORE MILLS MODERNIZED BY FULTON AT INGENIO VALDEZ, ECUADOR

If your mills are old and doing poor work, it's time to modernize!
Fulton housing conversions will give you the benefits of a new, modern tandem . . . at a fraction of the cost. Here's why:

- Better mill work at higher grinding rates.
- Free floatation of the top rolls.
- Top scraper rises with the top roll.
- Wide range of roll adjustments for longer roll life.
- Narrow turnplates requiring less power.
- Improved design long ram hydraulic top caps.

Existing bedplates, side boxes and bronzes, side caps and transverse bolts can be retained in most cases. On some conversions, existing turnbeams can be used.

COMPLETE TANDEMS — GEARING — PARTS

FULTON SINCE 1852

FULTON IRON WORKS COMPANY
St. Louis 10, Missouri, USA

FALK Gear Drives help inaugurate modern era of sugar-mill efficiency

When Lula Factory began to convert to steam-turbine drive, ten years ago, it marked the beginning of a modern era in sugar production. The Lula installation demonstrated for the entire industry a new and better method of obtaining higher grinding capacities plus more efficient, more economical operation.

The Falk Corporation is proud to have furnished the new gear drives and shaft couplings for the Lula conversion. Prior to that time, Falk had supplied many large gears for sugar mill drives, also high-speed gear reducers for turbine applications in other industries...Since the Lula installation, we have furnished various combinations of gearing for other turbine-driven sugar mills. All are *precision helical gears* of highest mechanical efficiency (98½% per gear mesh under full load). And all afford the increased load-carrying capacity of the exclusive Falk extra-depth tooth form.

The performance of any sugar mill depends largely upon the reduction gearing. So, when you consider installing a turbine drive on an old or new mill, it will pay you to consult your Falk Representative, write us direct, or ask your mill builder or supplier to consult Falk.

○ GEARS—Single Helical or Herringbone

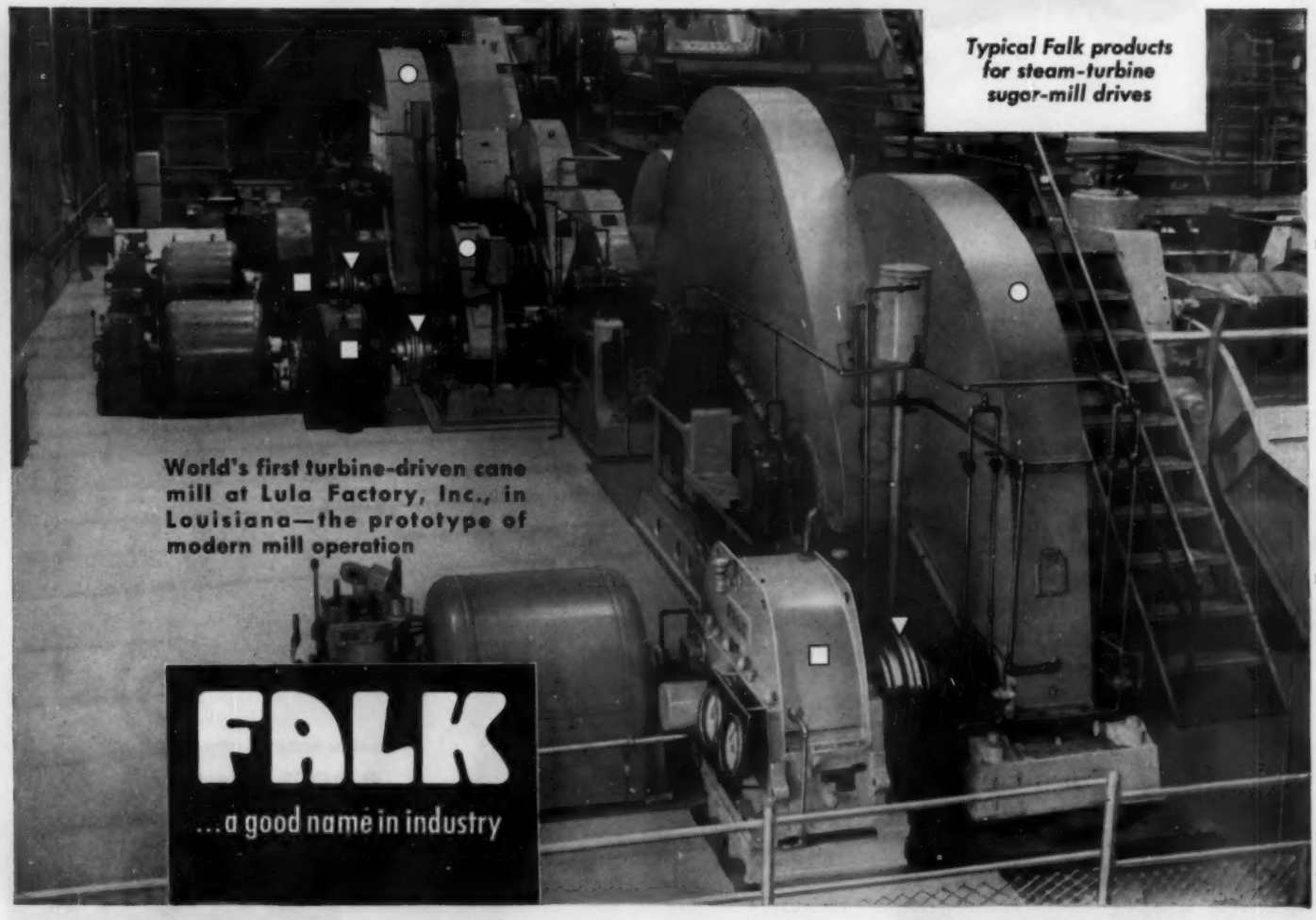
□ HIGH SPEED DRIVES

▽ STEELFLEX COUPLINGS

THE FALK CORPORATION, MILWAUKEE 1, WISCONSIN

MANUFACTURERS OF QUALITY GEAR DRIVES AND FLEXIBLE SHAFT COUPLINGS

Representatives in many principal cities



Typical Falk products for steam-turbine sugar-mill drives

World's first turbine-driven cane mill at Lula Factory, Inc., in Louisiana—the prototype of modern mill operation

TWO WAYS
TO INCREASE PROFITS

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STOP MAJOR SUCROSE-INVERSION LOSSES DURING MILLING WITH WYANDOTTE STERI-CHLOR 4X

Mill slimes and stale bagasse residues that form around Messchaert knives, juice screens, and elsewhere on milling equipment teem with bacteria, yeasts, and sucrose-inverting enzymes. These contaminants inflict the severest sucrose losses before control work at the mixed-juice tank even begins!

Wyandotte's STERI-CHLOR 4X cuts these sucrose inversion losses to increase your sugar yields—and sweeten sugar mill profits.

Potent sanitizer STERI-CHLOR 4X retards bacteria and yeast growth. It inactivates enzymes in contaminating sources. It cures and prevents severe dextran infections. STERI-CHLOR 4X provides low cost mill-train sanitation. And it can increase your sugar yields by as much as 3½ tons per 1000 tons of cane ground!

• • • • • • •

STOP COSTLY HEAT LOSS DURING EVAPORATION AND CRYSTALLIZATION WITH WYANDOTTE DEVAPOSAL

Scale-encrusted evaporators can cut your capacity in half! That's because dirty multiple-effect evaporators use up more heat, especially in the first effects. Now you can attain truly efficient heat transfer with convenient and safe-to-use Wyandotte DEVAPOSAL.

New DEVAPOSAL is especially designed to get evaporators, as well as vacuum pans, clean and scale-free quickly . . . without corrosion! It gets rid of even toughest calcium deposits.

A free-flowing, readily soluble acid-type product, DEVAPOSAL is much less corrosive to metals than muriatic acid. In fact, it's as mild on metals as sulfamic acid . . . but goes a whole lot further because it's concentrated. Generally, only 10 grams (⅓ oz.) of DEVAPOSAL per square foot of evaporator surface will do the job for you.

We'd like to give you more detailed information about both STERI-CHLOR 4X and DEVAPOSAL . . . and how they can be applied profitably to your sugar mill operations. The coupon below will secure technical bulletins and data for you. Fill it out and send it in, today.

Wyandotte® Chemicals

J. B. FORD DIVISION

WYANDOTTE CHEMICALS CORPORATION
EXPORT DEPARTMENT 3265
WYANDOTTE, MICHIGAN, U.S.A.

Please send details showing how STERI-CHLOR 4X and DEVAPOSAL can be applied profitably in my operation.

I would prefer data in ☐ English ☐ Spanish

Name_____

Title_____

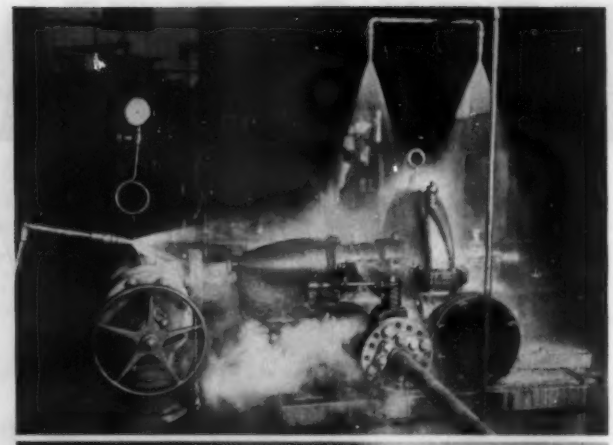
Firm_____

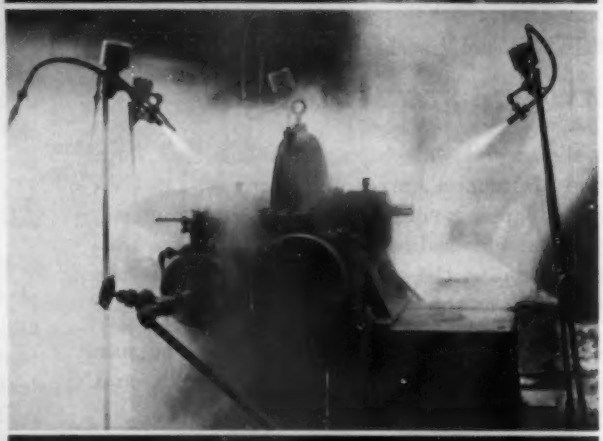
Address_____

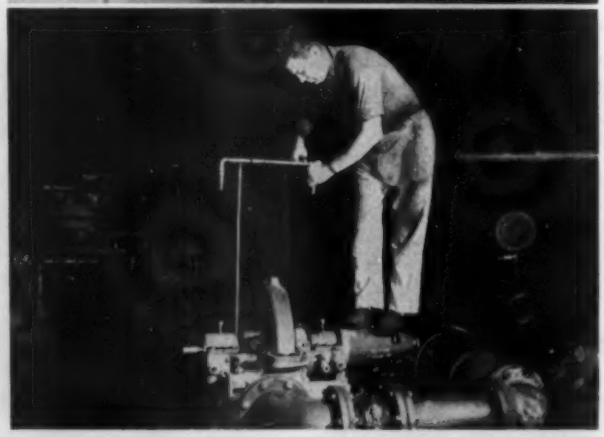
City_____ State_____ Country_____

NOTE: Please attach details about your mill's operation for more specific information on what STERI-CHLOR 4X and DEVAPOSAL can do for you.

tough tests like these can't damage a Westinghouse *mechanical drive turbine!*







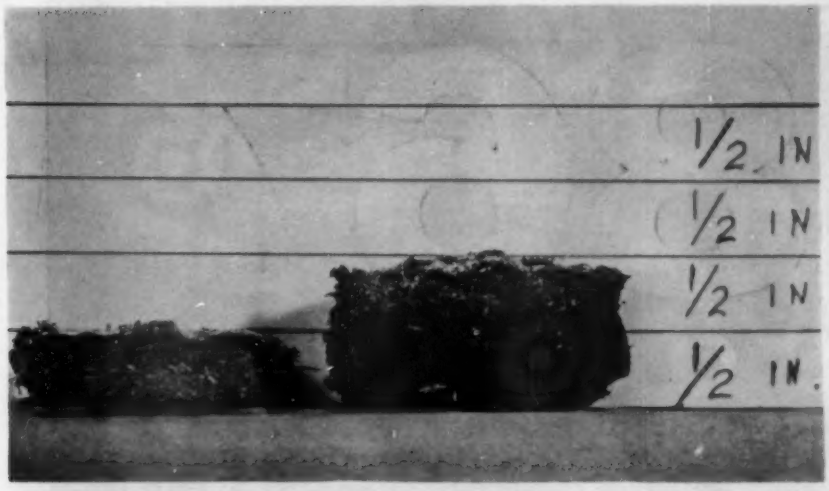
It's unlikely you'll ever run a turbine for hours beneath streams of water . . . spray abrasive dust over it at full-speed operation . . . or ask a 200-pound man to stand on its governor housing. Yet Westinghouse mechanical drive steam turbines take this punishment without faltering. Their bearing seals must keep water from contaminating lube oil; dust and dirt must never enter bearings or affect overspeed trip mechanisms. Full protection is built in against the hot, wet, dirt-laden conditions a turbine may face.

Westinghouse mechanical drive turbines are also *doubly* protected against accidental overspeed with *two* valves. Steam supply is shut off by the simultaneous closing of both the governor valve and an independent trip valve — or either alone can cut steam flow.

A new and optional feature is the Westinghouse DACA (Digital Analog Control Apparatus) — an advanced type of electric governor that allows extreme precision, within 0.1%, in preset speed.

Westinghouse builds the world's broadest line of single and multi-stage small mechanical drive steam turbines. Your Westinghouse distributor will be glad to survey your needs. Or write for bulletin 60-H, Westinghouse Electric International Co., New York 5, U.S.A. You can be sure . . . if it's Westinghouse.

Westinghouse



New Filtration Process Successful In Puerto Rico

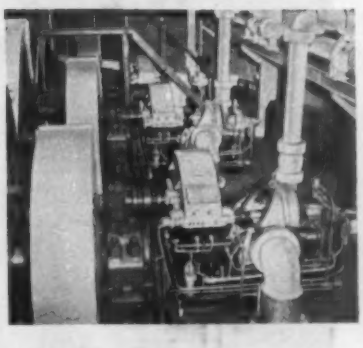
A new filtration process has recently completed a sucessful grinding season at the Plata Sugar Company's mill in San Sebastian, Puerto Rico. The process, designed by Dorr-Oliver Company and known as the D-O Rapi-Floc Filtration System, produces a clear filtrate from existing cane mud filters without the necessity of separate clarification. Cane mud is flocculated under close pH control so that large flocs form which permit the use of a porous filter cloth. Effective washing of the filter cloth without removing it from the filter prevents the development of a blinding problem. The filtrate is as clear as the normal clarifier overflow. As a result of the experience at Plata, J. M. Sheehan, Manager of Dorr-Oliver's cane sugar division, reports that a process development program has been initiated to investigate application to muds in other areas with the view ultimately to release the D-O Rapi-Floc Filtration System to the sugar industry throughout the world.

■

Newest in in-field transportation is the Albee Rolligon. It is made in California by a company which has been specializing in military vehicles for use in sand, mud and over ground unsuited for wheeled transportation. Two units were shipped to Hawaii and one to Dominican Republic for experimentation. Stubenberg Co., in Honolulu lengthened out the tricycle gear of the above unit to 105-inch wheel base and mounted a body on it suitable for carrying seed pieces in replant cane fields. The two-ton machine has a payload capacity of 3,000 pounds. Oahu Sugar Co. is trying out the new machine.

Westinghouse

TURBINES SUPPLY POWER DRIVE FOR PUERTO RICAN SUGAR MILL



The Westinghouse 500-hp type C-225 turbine mill drives shown here are part of the efficient power installation at Central Aguirre Sugar Mill, Aguirre, Puerto Rico. Six of these two-stage turbines, with Westinghouse flexibly coupled high-speed reduction gears, drive a tandem with a capacity of 4,800 tons per day.

Features of the type C-225 turbine include positive pressure lubrication; quickly removable cover of horizontally split casing for easy inspection; dual protection against overspeed, with simultaneous tripping of governor valve and independent butterfly valve; speed control as sensitive as ± ¼% to 6% where required.

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Westinghouse manufactures a full line of electrical equipment for sugar mills in many countries. The list is long, with products for power generation and distribution, power drives and motor controls, lighting, heating and other needs—all built to highest standards of dependable performance and economical service.

6,867
TONS/CANE/DAY

Illustration shows an 18 Roll Turbine-Driven Tandem Supplied to the Rio Haina Sugar Company in the Dominican Republic for a nominal capacity of 5,000 TONS/CANE/DAY.

The Tandem is now grinding at the rate of 6,867 TONS/CANE/DAY and the photograph which was taken with the mills in operation strikingly illustrates the reduced number of operators required to run a modern Milling Tandem.

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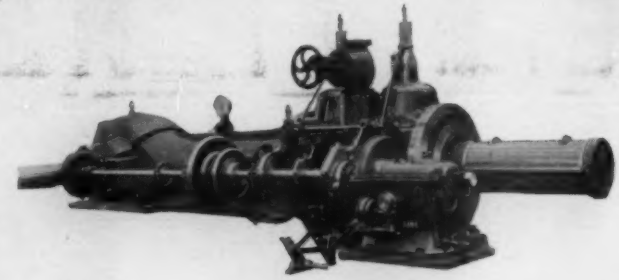

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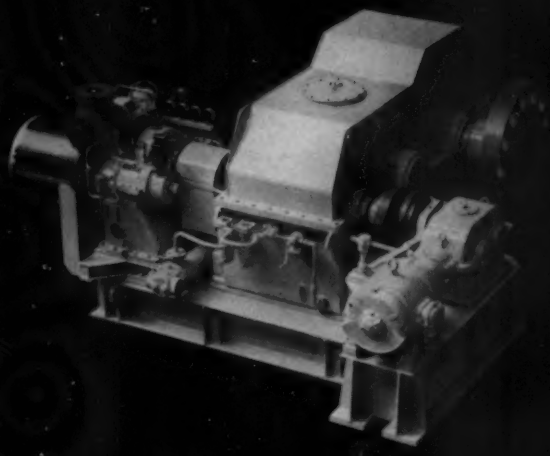

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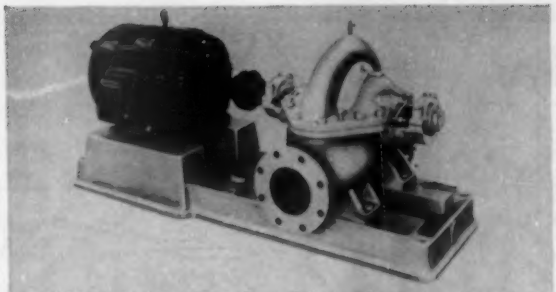
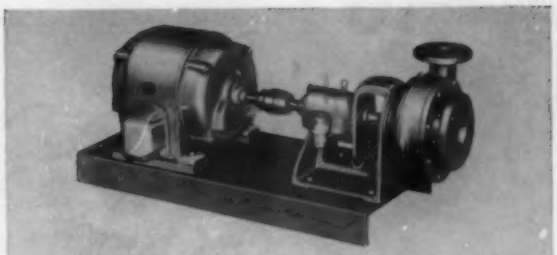
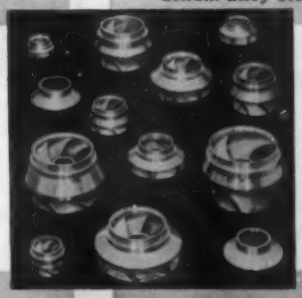


L Line This horizontally-split, double suction pump allows for easy removal of rotor without disturbing connection piping. Unit has replaceable wearing rings and shaft sleeves.

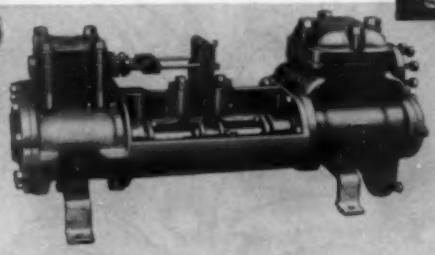


SESC Line These efficient, vertically-split open or closed impeller pumps have a maximum number of interchangeable parts. Available in all iron, all bronze, standard fitted or corrosion resistant Worthite (high nickel, high chromium and molybdenum alloy steel).

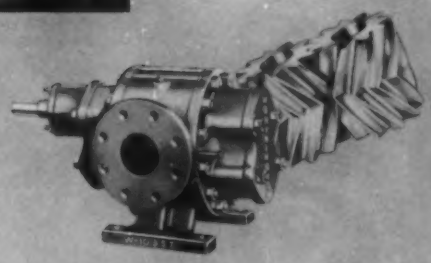
FL Line Available with 3" to 8" discharge, the FL chokeless two-vane line can be supplied for a wide selection of discharge nozzle positions. Vertical and horizontal units are available for wet and dry pit installations.



UHF Line The new Ultra High Flow line of vertical turbine pumps includes 36 different impeller designs. It features high efficiencies over a wide operating range, thus cutting power costs. Oil or water lubricated.



VA-VC Line These duplex, double acting cap-and-valve-plate steam pumps are built for a broad range of steam and liquid pressures. Units are furnished with removable liners. Can be equipped with hardened steel fittings, ball valves.



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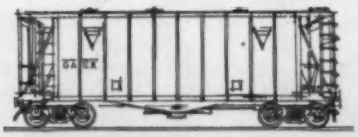

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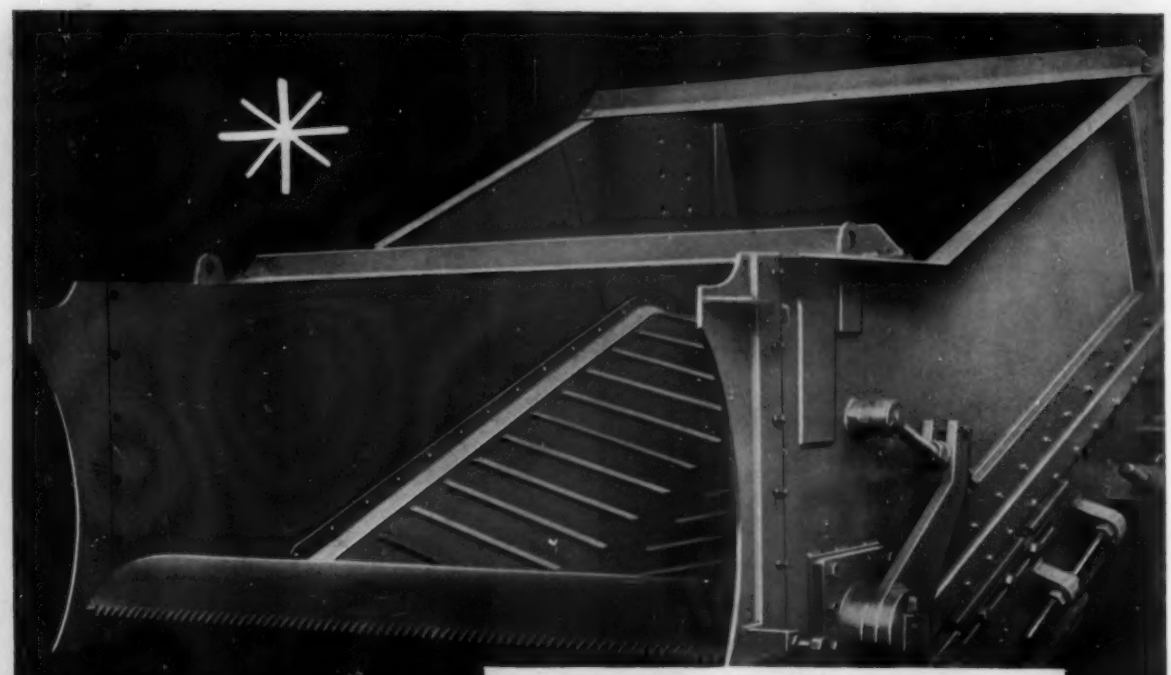

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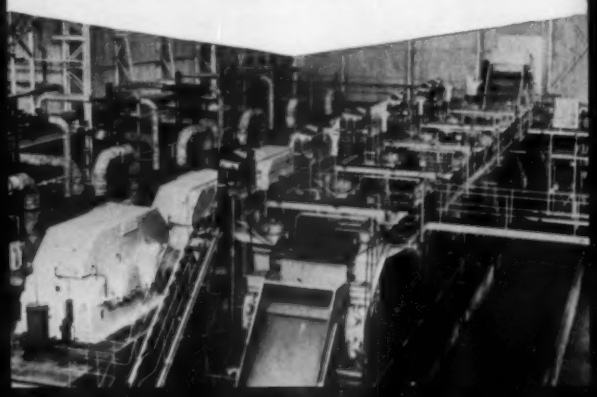

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First Beet Campaign In Pakistan

By Dr. H. Kampf, Dr. Tech. Sc., F.R.I.C.

THE first beet campaign in the history of the Pakistan sugar industry was completed on July 2, 1960 with the production of 2,420 short tons of white sugar at Charsadda Sugar Mills in North West Pakistan. Yield averaged 9.02% from 26,750 short tons of beets sliced. Planting took place in November 1959. The beet end, as part of the cane sugar factory, started slicing on May 15, 1960.

The origin of this unique operation goes back more than 40 years. First attempts to establish a beet sugar industry in this area were undertaken in 1914 in the North Western Frontier Province of India, now the Northern part of West Pakistan. A report of the Indian Sugar Committee was published in 1920 and stated that sugar beets had been grown experimentally at the Tarnab agricultural station in the Peshawar Valley for the preceding six years. During these six seasons, the report stated that the yield per acre had never been less than 18 short tons and usually exceeded 22 tons. The Committee concluded that "sugar beets can be grown successfully and economically in the North West Frontier Province." A few years ago these studies were resumed at the Charsadda and Premier sugar mills in the same region. now North West Pakistan. (See SUGAR Y AZUCAR, page 30, June 1959, *"Crushing Beets In A Cane Mill: Establishing Beet Industry In Pakistan,"* and page 68, November 1959, *"Beet and Cane in West Pakistan."*)

The need to expand the Pakistani sugar industry is to be found in the fact that this is one of the few countries in the world where sugar rationing persists. Introduced during World War II, it has been continued in an effort to save $6,000,000 in foreign exchange that would be required for the importation of sugar. Rationing is severe; 1¼ lbs per month are allowed per person in towns, with only 10 oz. per person per month in rural areas, Even this small ration has been cut by 25% until the start of the next cane crop in late 1961.

White sugar production from sugar cane has declined by 32,000 short tons from the 1959 to the 1960 crop. Sugar production of the 14 Pakistan cane mills reached only 156,000 short tons of white sugar in the 1959/60 season as compared with 188,000 short tons in the previous season. Cane crushed totaled 2,120,000 short tons against 2,260,000 tons in 1958/59. Yield had droped from 7.943% to 7.377% in the last crop. Reduction in cane sugar production was caused by frosts and a prolonged period of cold and unfavorable weather during the growing and harvesting season. Each of the three modern mills in the Peshawar Valley of North West Pakistan had to process frost-damaged cane. The accompanying Table 1 shows the comparative results of the 1958/59 and 1959/60 crops.

Table 1

(short tons)

	1958/59		1959/60		
	Sugar Production	Yield %	Sugar Production	Yield %	Shortfall
Premier	45,600	7.289	30,200	6.540	15,400
Charsadda	24,900	7.201	19,900	7.095	5,000
Frontier	18,300	7.738	14,900	6.775	3,400
			Total shortfall		23,800

Pakistan's "Second Five Year Plan" covering the period 1960 to 1965, designed to speed up agriculture and industry, includes a plan to increase white sugar production to 425,000 short tons per year by 1965. This would, at least, supply present controlled consumption. Because of unfavorable cli-

The D. d. s. diffuser in the Charsadda mill shown at left with the scalding tank at right. Equipment was purchased in Germany in time for the May-July 1960 beet campaign.

The combined cane and beet factory at Charsadda Sugar Mills in North West Pakistan.

During the early experiments in processing sugar beets no mechanical washers were available, hence beets were washed in the truck as shown.

matic conditions in North West Paskistan, the Plan recomends the extension of cane cultivation in East Pakistan and the southern regions of West Pakistan which are geographically and climatically more suitable for this crop. In addition to the plans for the expansion of the cane sugar industry in these areas, recommendations are included for beet sugar production in the districts of Mardan, Charsadda, Peshawar and in the Quetta region near the Iranian border.

At the Charsadda Sugar Mills, where the first beet campaign has recently been completed, the cane sugar mill went into production in 1956. The mill was designed and constructed by Buckau R. Wolf of Grevenbroich, Germany. Machinery for the beet sugar factory was supplied by the same company. After completion of grinding 282,000 short tons of cane on May 15th. 1960 the beet sugar end was started up. While the yield at 9.02% was below results obtained in other beet producing areas it was considered encouraging in comparison with the 7.095% recovery at the mill while processing cane.

During the beet campaign in May and June of this year daytime temperatures at Charsadda reached 105° to 110° F with nightime temperatures of 75° to 85° F. No difficulty was experienced with these temperatures provided the beets were handled expeditiously. Under these temperature conditions lengthy storing of the beets must be avoided.

The beet factory uses a D. d.s. diffuser. For juice purification the de Haan double carbonation-sulphitation, used in the cane sugar mill, was slightly modified. Bleaching powder or SO_2 was mixed with the water in the beet washer. A scalding tank preceeded the main diffusion and pre-defecation was carried out in a Brieghel-Mueller apparatus.

Beets were grown on about 4,000 acres by a large number of Pakastini peasants. Beet seed was imported from Europe. About 3½ tons of beet seed came from Kleinwanzlebener Saatzucht in Germany, 12 tons from Agrimpex in Hungary and smaller quantities from France, Holland and Italy. Planting took place late in November 1959 with about eight pounds of seeds per acre. Frosts, which had caused damage to the cane crop, did no damage to the beet crop. Sugar content of the beets averaged 14.67% with maximum of 17.00%.

Fuel for beet processing was supplied by bagasse left over from the cane crop supplemented by 60,000 imperial gallons of fuel oil.

The future prospects for a combined beet and cane industry in North West Pakistan are encouraging. Valuable experience in cultivation and processing is being gained at Charsadda. Beet processing machinery, mainly diffusion equipment, will soon be added to other existing cane mills in this area and may help greatly to relieve the white sugar supply situation in Pakistan.

A bag of sugar beet seed delivered in Pakistan in November 1959. Hundreds of peasants planted the seed, cultivated and harvested the beet crop.

First Phytotron In Australia

Colonial Sugar Building Plant Research Center

To obtain basic knowledge about the physiology of the sugar cane plant, a huge, modern research center is being constructed on three acres of ground at Brisbane, Australia by Colonial Sugar Refining Company. To be known as the David North Plant Research Centre, after David Shepherd North, a retired officer of the company who pioneered research in cane disease control and breeding, it is estimated that the center will cost £300,000 to establish and £40,000 a year to operate according to an announcement by Dr. James Vernon, General Manager of C.S.R.

The establishment of the Research Center forms part of Colonial's long term plans to improve cane varieties. Knowledge obtained should help plant breeders to grow higher sucrose canes, with extended periods of maximum sucrose, yielding juices that are easily processed and possibly to develop more erect varieties that will be easier to harvest mechanically. C.S.R. is already spending more than £200,000 yearly on research. While C.S.R. does not grow cane commercially in Australia and only to a very small extent in Fiji, it is intended that the results of the research work be made available to independent cane growers in Australia and Fiji. In this way it is hoped to reduce the high cost of producing sugar in Australia in order to keep sugar cheap on the home market and to maintain a strong position in the world market. Research work aimed at increased efficiency and lower costs per ton of cane and of sugar must proceed if the industry is to be competitive and economically viable in future.

The Research Center will be directed by Dr. K. T. Glasziou who joined the staff of the Colonial Sugar Refining Company in 1955 as a plant physiologist. Dr. Glasziou served in the R.A.A.F. during the war and subsequently engaged in dairy farming in New Zealand. In 1950 he enrolled in the faculty of agriculture at Sydney University. A year later he changed to the faculty of science and graduated early in 1955 with first class honors in biochemistry, winning the "Roslyn Flora Goulston" prize for biochemistry and the "GP Ltd" prize for biochemistry and pharmacology. He obtained his Master of Science degree in 1956 and his Doctorate in 1958. Dr. Glasziou worked as a research fellow at the California Institute of Technology and did further work with Dr. G. O. Burr at the Experiment Station of the Hawaiian Sugar Planters' Association.

The main feature of the David North Plant Research Centre will be a phytotron consisting of a number of air-conditioned greenhouses and growth chambers in which many aspects of the environment are brought under rigid control. Conditions in some of the rooms will be controlled to such a degree that to avoid contamination by insects and microorganisms, staff working on the project and visitors will be required to wash and change clothing before entering.

Expected to start operation during 1961 the phytotron at the David North Plant Research Centre will be the first in Australia and the fifth in the world. It will be the first devoted solely to sugar cane and the first devoted to any single crop.

The phytotron will eliminate most of the variables which plague field experiments and will render unnecessary the elaborate statistical precedures in experimental design. It will be used to implement a program of basic research on the physiology, biochemistry and genetics of sugar cane. As with all basic research, the objective will be to uncover new knowledge, but the guiding principle in selecting specific lines of research will be the potential to yield results likely to lower the cost of sugar production.

In the initial work the major commercial varieties of sugar cane and a number of selected varieties of interest to the breeder will be investigated. The aim will be to determine the effects of environmental factors such as air and root temperatures, light intensity and duration, mineral nutrition, and water regime on the growth rates of the plants, and on the yield of sugar. Parallel studies will be made on the movement and storage of sugar within the plant and on the mechanisms for synthesis and conversion. For this work varieties of sugar cane of a wide range of sugar content and plants from related genera will be compared. The inheritance of some of the factors involved in growth and sugar production will be studied using the controlled environments available in the phytotron. It will also be possible to use techniques for genetic studies not readily available to the plant breeder working under field conditions.

Flowering in cane is known to be strongly influenced by day-length, light quality and night temperature, and the requirements in each to these are very narrow. To cross two varieties it is essential that they flower at the same time. The genus *Saccharum* includes different species of sugar cane which flower at different times of the year, and sometimes rarely and only in favourable localities. To facilitate work in the breeding of new cane varieties, the flowering of sugar cane will be investigated. The design of the phytotron is such that the environmental conditions which will induce a particular variety to flower may be sorted out and then reproduced whenever required.

An additional outcome of the work will be the possibility of obtaining two or three generations where one can be obtained under field conditions, and hence a speeding-up of certain propects in plant breeding.

The establishment of a phytotron for the study of a single crop is unique. The results from the research projects described and many others on the agenda can be expected to have a considerable influence on the future of the Australian sugar industry.

■

Expansion At American Molasses

American Molasses Company, a major refiner of granulated and liquid sugar, has acquired through an exchange of stock all the outstanding capital stock of Lanco Products Corp. and its wholly-owned subsidiary, American Breddo Corp. Frank C. Staples, president of American Molasses, pointed out that his company serves the entire food industry including ice cream, confectionary and baking; Lanco and American Breddo are leading suppliers of ingredients for the baking, ice cream and dairy industries supplying emulsifiers, stabilizers and related products. Manfred Landers, president of Lanco and Andrew de Balogh, president of American Breddo will continue their association with their organizations.

■

Huge Irrigation Project Approved

The government of South Africa has approved the Pongolapoort-Makatini Flats water scheme, which entails the utilization of the water resources of the Pongloola River for the irrigation of sugar cane in Zululand east of the Lebombo Mountains. The work to be started this year and completed by 1976, and will be the largest of its kind ever undertaken in the Union and is estimated to cost £78 million. It is scheduled to bring under irrigation 64,000 acres of sugar cane land, which it is estimated will produce 560,000 tons of sugar annually.

Bagasse leaving the 4th (last) mill.

Modifications at Usina St. Lydia

Increasing Existing Mill Capacity

By Luis Antonio R. Pinto, EE. & ME

General Concepts

The adoption of the modern milling process, using high peripheral speed and forced feeding, can considerably increase the capacity of an existing mill, without loss in extraction if the necessary precautions are taken.

Let us first analyse the several variations involved (with the exception of mills and trashplate settings, which are considered adequate for each case throughout this report).

Slipless Milling

Let us take a mill of uniform length, with rolls of diameter "D" (fig. 1) and suppose that it is being fed with a bagasse blanket of "h" height and "d" density.

Admitting that there is no slipping between bagasse and rolls, the weight of bagasse milled in one minute will be proportional to the peripheral speed of the rolls (v), to the height (h) and the density (d) of the bagasse blanket, or:

$C_{(capacity)} = K_o \times V \times h \times d^{(1)}$, K_o being constant.

taking $K_o \times V = K \times n \times D$:

$(K = \text{constant} = K_o\pi)$

$C = K \times n \times D \times h \times d\ (\pi)$.

This is the theoretical capacity for slipless milling. In order to improve the capacity of a given mill, n, h and d may be increased.

Influence of Slipping

In practice the value of C in the above formula is never reached, as slipping can never be completely eliminated. This slipping is definitely disadvantageous, because it not only reduces capacity but also increases tremendously the roll wear. Therefore it must be reduced to a minimum.

Relationship Between Several Variations And Slipping

For a given mill the slipping
- increases by increasing n
- increases by increasing the height h
- decreases slightly by increasing d
- decreases with increased drainage area
- decreases remarkably with the increase of what may be called the "pulling coeficient" (coeficiente de arrastamiento) of the rolls, affected by the grooving, roll material, etc.

Extraction

We believe that extraction is not affected by reasonable increases in *h*, *n* and *d*, whenever suitable drainage for the extracted juice is provided. Otherwise, extraction is *increased* by better cane preparation, one of the means used to increase *d*, as shown below.

Proposed Modifications

From the above explanations the following modifications, in logical sequence, may now be considered:

Increase of the roll's "pulling coefficient"

The roll's grooving pitch should not reach below ¾"; its included angle should range between 50° and 55°. The roll material must be hard and coarse grained.

The use of the "chevron" grooving (longitudinal V shaped grooving) in the top and feed rolls is strongly advised. Another good measure is the adoption, in the feed roll, of a pitch twice that used in the discharge and top rolls. It not only increases the pulling coeficient, but also allows for a better juice drainage, as shown below.

Use of feed rolls

The use of feed rolls, together with the metal slat intermediate carriers, assures a perfect and uniform feeding. The feed roll is a cylinder made of sheet steel, filled with water or sand, and reinforced with V-shaped ribs (fig. 2). It compresses the bagasse blanket (decreasing *h* and increasing *d*) and pushes it towards the feed opening of the mill.

The outside diameter of the feed roll generally lies between 0.7 to 1.0 D (D being the mill roll's diameter). The (peripheral) velocity of the feed rolls should be equal to the linear velocity of the intermediate car-

Feed rolls at work.

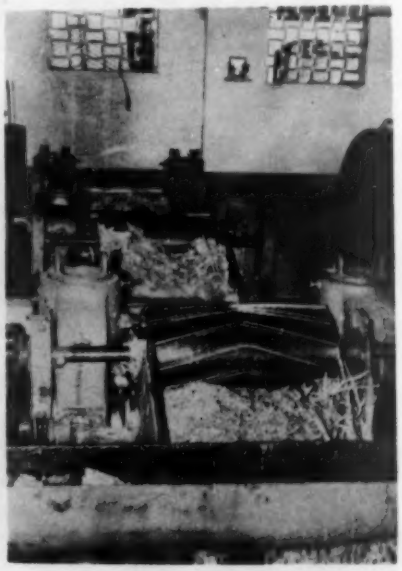


Fig. 1

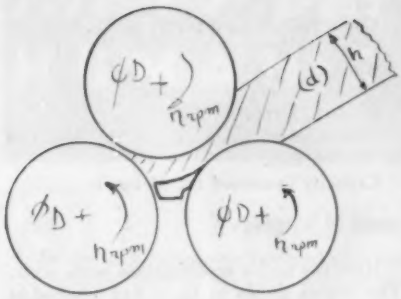
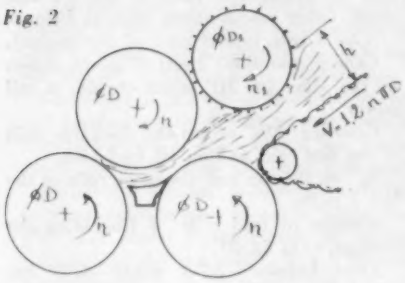


Fig. 2



rier, or about 20% higher than the (peripheral) velocity of the mill rolls.

Thus we shall have:

$$n_1 = 1.2 \frac{D}{D_1} n, \text{ being:} \begin{cases} n_1 = \text{rotation of the feed roll} \\ D_1 = \text{diameter of the feed roll} \\ n = \text{rotation of the mill roll} \\ D = \text{diameter of the mill roll} \end{cases}$$

Every mill should have a feed roll supported by a floating shaft, driven by the top roll.

Increase of the juice drainage

Every mill should be provided with a feed roll with Messchaert grooves and/or double pitch (fig. 3). Messchaert grooving for the discharge roll is not advised.

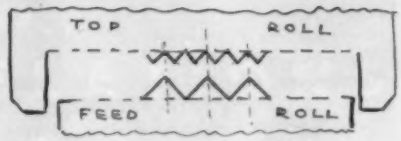
The use of small parallel grooves at the end (shoe) of the thrash-plate, about 2" long, 1" deep and ¼" wide, effectively aids juice extraction.

Better cane preparation

The use of two sets of knives, of small pitch, penetrating deeply into the cane blanket, almost to the bottom, produces a very even blanket, at the same time increasing its density (d).

This type of preparation (two small-pitch sets of knives) for the shredding action is strongly favoured. If not comparable to that obtained by a swinging hammer type of shredder, it is, nevertheless, very good, with a considerable cost reduction.

Fig. 3



If, however, maximum capacity and extraction are desired, the use of one set of knives and one shredder is indicated.

It is important to note here that the power employed in cane preparation is regained at the milling process, which now is responsible only for the juice extraction.

Rotation (n) increase

Now *n* may be safely increased. However, as slipping increases steadily with the peripheral velocity, a suitable limitation must be found. The great mills of recent design can reach speeds of up to 18 to 20 m/min. But the slipping also depends on the feeding angle, α (fig. 4) and this angle, on first approximation, is related to (h/D). That is why these fast great mills, in general, must work with a lower value of α to compensate for the high speed.

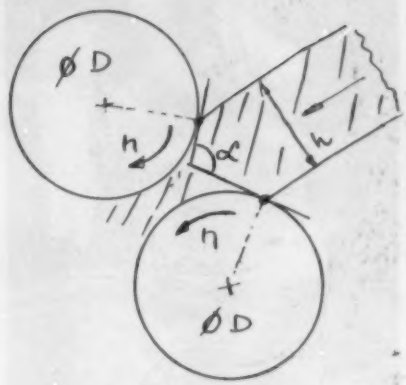
For this reason and considering also that the great majority of mill shafts work into slide bearings (bronze), we would rather place a limit on *n* instead of limiting the peripheral speed. In our opinion n = 6 rpm is a safe limit in most cases.

The Crusher Feed (Two Or Three Rolls)

The above modifications having been made, it often happens that the crusher feed becomes the limitating factor. To eliminate this trouble, the classic system of crusher feed was abandoned (using a steep and long shute) and the system represented in fig. 5 was adopted.

In this system the cane carrier, of variable velocity, feeds an intermediate carrier, of constant speed, driven by the crusher. This carrier, with the aid of a feed roll, feeds the crusher. The system assures perfect and even feeding, with an incidental

Fig. 4



reduction of installation costs, eliminating the necessity of a high and long cane carrier.

Limitations

Power

Every increase in cane milling capacity requires a corresponding increase in the power output of the mill's motor(s) (with the exception of that gained by cane preparation, as seen above).

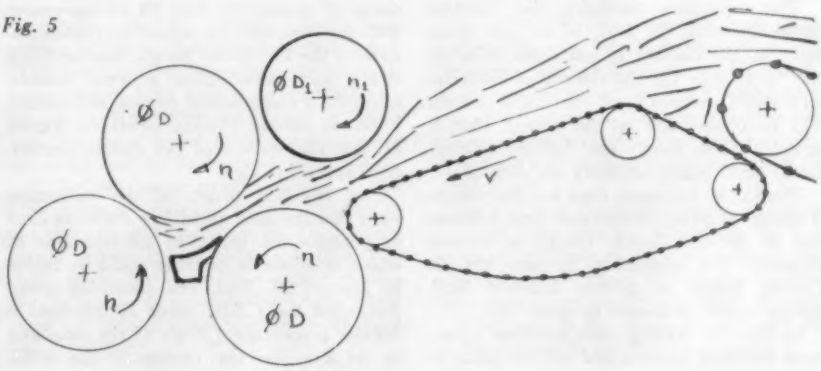
If a substitution of the motor(s) becomes necessary, modern practice shows that the steam turbine is the best replacement for the old piston type steam engines.

Durability and Strength

Wear and strength also impose a serious limitation on increasing capacity. Due to the great bagasse charges (height and density), high, instantaneous stresses may appear in the mills, especially if the hydraulic system which controls the top roll lift is not working fast enough (pipes of small diameter, friction, etc.). Stress and wear on shafts, gears and journals are also accentuated. For this reason generalization is impossible, conditions being different for each case, depending on design, age, manufacturer, etc.

A careful study should be made in each case, with the possible aid of the mill manufacturer.

Fig. 5



Feeding the crusher (1st mill) in the new process.

Results Obtained At Usina Sta. Lydia

The Usina Sta. Lydia in Ribeirão Preto, Brasil, has the following machinery:

Mill manufacturer: Cie. Fives-Lille, France, 1947.

Total number of mills—4.

Total number of rolls—12.

Dimensions: o = 530 mm, l = 1010 mm.

Drive: 1 Corliss engine, 350 HP.

Until 1956 we had the following characteristics:

n = 4.3 rpm;

Final bagasse { 3.6% sugar / 45.0% humidity

Number of feed rolls = o

Grooving: 1½" on the first mill (crusher), ¾" on the others.

Grooving angle: 55°

"Chevrons" grooving: on all feed and top rolls.

"Messchaert" grooving: none.

Cane preparation: 1 set of knives, 160 HP motor at half power.

Milling capacity: (Average 24h, 12% fiber) 23 ton/h.

The following modifications were introduced and the results noted:

1956

Number of feed rolls: 1 (on the last mill)

Capacity increased to: 26 ton/h.

1957

n = 4.5 rpm

Number of feed rolls: 3 (on the last three mills)

Capacity increased to: 31 ton/h.

1958

n = 4.75 rpm

"Messchaert" grooving: on the feed roll of the 4th mill.

Capacity increased to: 34 ton/h.

1959

Here the major modifications were made. The system shown in fig. 5 was adopted to feed the crusher, in place of the old high chute. Other modifications were as follows:

n = 5 rpm (speed limit of our engine).

Cane preparation: 2 sets of knives, driven by the same 160 HP steam engine, at full power.

Grooving: 1½" on top and discharge rolls of the first mill and on all feed rolls.

¾" on the top and discharge rolls of the last 3 mills.

Number of feed rolls: 4 (including the crusher, as in fig. 5).

Final bagasse: 3.7% sugar—47% humidity.

Capacity: raised to 42 ton/h.

During 1960 we shall cut "Messchaert" into all feed rolls, and for 1961 we plan to exchange our piston engine for a steam turbine which could raise *n* to 6 rpm.

■

Sugar Dispute In Fiji Threatens Colony's Economy

CANE cutting in Fiji should have started on June 20. Because of disagreement between the growers and the mill owners, no cutting began until early August and then only in one isolated area which can supply at best 15% of the British Colony's quota.

Sugar produces 63% (about £F8 million) of the Colony's export earnings. If sugar is not produced in reasonable quantities, the Colony faces economic ruin, and consequent upon it ugly civil strife.

The Australian company, the Colonial Sugar Refining Co. Ltd., is the sole processor in the Colony. It has three mills on the "dry" side (in the vicinity of Nadi International Airport) of the main island, Viti Levu, and one on the second biggest island, Vanua Levu. The Labasa (Vanua Levu) mill began crushing on August 11.

The C.S.R. Company does not grow cane. Although it owns considerable land it leases this in 10 and 20-acre blocks to tennant farmers. The remaining farmers are on Crown, Native or private freehold land mostly leased or owned in small lots.

In 1959 the existing cane purchase agreement between farmers and millers came to an end. This year began with stockpiles of sugar at maximum permissable level. New cane varieties, better farming techniques and favourable weather resulted in a crop calculated to produce some 20% more sugar than the quota.

Negotiations brought agreement on price and a realization the C.S.R. Company could not take the entire crop without crushing beyond the quota. Dispute between millers and growers remained, however, on how the cane should be selected to produce the quota of sugar. On July 24 an agreement with the company was signed by representatives of the Fiji Kisan Sangh, Labasa Kisan Sangh and three Fijian growers' associations. As a consequence cutting and milling began at Labasa (Vanua Levu) on August 11. But the leaders of two Indian associations refused to sign.

The essential points of the agreement were that the mill would buy sufficient cane to produce the quota of 199,000 tons of sugar, or whatever quantity could be milled by January 23, 1961. The dissenting group demanded the C.S.R. agree to purchase a definite percentage (76%) of the cane and fix no date for the closing of the mills. Company representatives were adamant that although they expected to buy about 80% of the crop they could not fix a definite percentage and that it was uneconomic to mill after January 23. The July 24 agreement was the result of concessions on both sides. It was signed by representatives of the Fiji Kisan Sangh, Labasa Kisan Sangh, the Nadroga, Ra and Ba Fijian Cane Growers Associations. These groups were estimated to represent 65% of the farmers. But although the dissident groups, the Fiji Maha Sangh and the Vishal Krishak Sangh, represented only about 35% of all the Colony's growers, they represented nearly half of the all-important Indian growers on Viti Levu.

There is a strong feeling in the Colony that the aim of those refusing the July agreement is not primarily to achieve better purchase terms for the farmers this year, but to drive the C.S.R. Company out of Fiji and replace the company with locally owned mills. For this objective to be achieved the Colony will have to pay the price of economic misery and social chaos.

Philip Matthews
Suva, Fiji.

Sugar's Progress in

HUMAN RELATIONS

Roy J. Leffingwell

Your Office In 15 Years

In the past half-century remarkable changes have taken place in the importance of office work. Even in the sugar industry, paper work is increasing at an alarming rate. Competition is keener, and poor control of a business can wreck it overnight.

This increasing importance of control has resulted in substantial increases in the number of people engaged in administration and service. One dollar out of every $8 paid in wages and salaries in the U.S. now goes to clerical employees. By 1975 this will double, according to best authorities.

Something must be done about the increasing cost of paperwork. As a result, research and development in the office equipment field is currently greater than that for most other industries. It appears that the future will bring a great number of exciting new developments for both the large and small office.

Arthur K. Watson, president, International Business Machines World Trade Corporation, outlines some of products that the small office (of a sugar company, for example) may expect in the not-too-distant future.

Let's take the typewriter. It will be completely noiseless, but in addition it will be a voice-writer. In other words, you will dictate directly into it, and the typewriter will put the words on paper. The machine will have a memory system that enables it not only to spell correctly, but also to do grammatical editing. Small offices that cannot afford such elaborate equipment will be wire-connected to an outside service center which will be equipped to provide the service at a low cost.

The typewriter will produce finished letters with both margins justified, and type will be available in varying colors. It is even possible that the color of the letter will suggest the tone of the contents.

The duplicating machine of the future, says Mr. Watson, will be a desk model without ink or chemicals. Letters will be reproduced in such a way that the copy will be identical to the original. File copies of the reproduced material will be miniature in size so they can be filed and retrieved automatically and rapidly by machines.

File display screens, mounted on the wall, will be in offices of the future. Files will be searched electronically and their contents displayed on the screen. One central filing system will serve all locations in a company.

Adding and calculating machines will have the ability to read and total a column of figures electronically. Invoices will be fed into calculating typewriters which will sense the figures and perform all the arithmetic with electronic speed and accuracy.

Data will be gathered automatically at the point of action—as the event happens, whether it is the weight of a cane haul trailer, the register of a sale, a bank deposit, the completion of a product, a new birth, a court decision, or a medical diagnosis. These data will be automatically communicated to a central processing memory and control installation.

"People in offices will be thinking more of how to do things better and will be directing machinery to do their work most of the hours of their day. There will be much less drudgery or physical labor," says Mr. Watson.

"I used to think that once I had charge of an institution I could make it do anything I wanted it to. But after an organization grows to a certain size it has a life of its own and you can't make it do much of anything, however much power you have to hire and fire. You must work constantly through education, persuasion, and demonstration to get your own people to do what you think ought to be done.

"Any organization, once it becomes successful, is apt to lose its original drive and vision. Despite their idealism, or perhaps on account of it, cooperatives are no less vulnerable to this kind of erosion.

"People change whether institutions change or not, and institutions that forget this are left behind. Executives get into ruts, many people don't want to think. Most people are afraid to tackle something new. Then, too, they get a vested interest in what they are doing and try to defend it to the death.

"I believe many people oppose a new idea because they don't feel capable of jumping in and handling it. They would rather oppose it and keep their little jobs down pat as they've got them organized, than try to tackle something that might throw them out of their routines—and possibly out of their jobs."

The above is part of a book, "Vice President in Charge of Revolution," McGraw-Hill Book Co. Inc.

An unusual school for executives is being sponsored by the U.S. National Educational Assn. A number of larger companies are using it and getting good results. Small groups of executives go to a training school for a week, and analyze each other's qualities of leadership and executive ability.

Hawaiian Commercial & Sugar Company has installed the Universal Maintenance Standards (UMS) in their Mobile Equipment Shop Division.

It showed sufficient satisfactory improvement that the program has now been expanded to various operations of the Machine Shop Division. This includes the machine shop and the welding and blacksmith shops. Some 12 to 15 weeks are required to set standards in these various operations.

UMS is a method of work measurement, specifically applied to maintenance work. It gives supervisors a tool whereby the actual time required to accomplish a given task can be compared with an engineered optimum or standard time of doing the job. UMS was developed by H. B. Maynard Co. of Pittsburgh, Pennsylvania.

Editors of Hawaii's sugar employe publications recently held their annual conference. Editors from the plantations on the four sugar producing Islands formed the Hawaii Plantation Industrial Editors Association.

For more than 10 years editors of Hawaii's sugar plantation papers have met annually to improve their skills and keep abreast of the industry. For example, this year sugar scientists from the Experiment Station, Hawaiian Sugar Planters' Assn. told editors of projects being undertaken.

The Hawaiian Commercial & Sugar Co., located on the Island of Maui, won the top award for the best sugar plantation employe publication for 1959-60, presented by the Hawaii Plantation Industrial Editors Association.

Harrison Foss, editor of the prize-winning publication received the annual trophy from Slator Miller, vice president of the Hawaiian Sugar Planters' Assn.

In addition to being selected as the best paper for the year, Mr. Foss' paper was given the trophy for the best safety feature. The article was entitled, "The Truth About Accidents." It points up hazards to safety and ways to avoid accidents. Five case histories, illustrated with photos, dramatically told the safety story.

Grove Farm Plantation News, edited by Richard Tom, won top honors for the best one-man publication. This publication also won the 1958-59 award for the best publication which is put out by only one individual.

Other awards are given annually for the best feature story and best news photo.

facts about sugar

NEW YORK, SEPTEMBER 2, 1960: Congress adjourned September 1st without enacting legislation which would extend the Sugar Act beyond March 31, 1961 and give the Administration discretion to by-pass the Dominican Republic in replacing Cuban sugar. B. W. Dyer & Company, Sugar Economists & Brokers, believe that the Administration will continue to try to find loopholes in the present legislation, or may delay authorization until it is too late for the Dominican replacement sugar (321,857 tons) to enter the U. S. this year.

Two days before adjournment, the House of Representatives had passed a bill granting the President power to by-pass the Dominican Republic, provided that the majority of nations in the Organization of American States undertook economic sanctions against that country before October 15, 1960. The Senate realized that such a proviso would hamstring the President, and eliminated such restrictions from the legislation it subsequently passed. The House Committee on Agriculture, however, again refused to give the President carte blanche, and the new legislation died.

Lawrence Myers, head of the Agriculture Department Sugar Division, testified at the House Committee on Agriculture hearings on August 26th, and was reported to have said that the U. S. would have no trouble getting enough sugar next year even if Cuba and the Dominican Republic were cut out entirely. At the previous day's hearings, G. Douglass Debevoise, president of the South Porto Rico Sugar Company, warned that there would be a scarcity of sugar in the U. S. and a rise in prices if U. S. purchases of Dominican sugar were cut.

Premier Castro on August 6th announced the seizure of virtually all U. S. owned investments in Cuba, including 36 sugar mills and property valued at $350,000,000. It was stated that the 2% bonds, supposed to pay for the property, would have a 50-year maturity instead of the 30-years announced originally. Moreover the money to pay for them will come from one-fourth of the value of all Cuban sugar bought by the U. S. in excess of three million tons annually at a price of 5.75¢ a pound.

Following this, the International Cooperation cut Cuba off as a supplier of sugar purchased by foreign nations under the Mutual Security Act. This was revealed when the ICA amended a purchase grant to Morocco. The ICA estimated that $20-25,000,000 of foreign aid funds are granted annually for sugar purchases, with the greater part normally purchased from Cuba.

Domestic spot (#6) raw sugar prices declined to $5.90 per 100 pounds early in August, but firmed towards the end of that month to $6.05.

Refined sugar deliveries slackened somewhat in August from the abnormally high rate in July. Nevertheless, cumulative distribution through August 27th was still 233,000 tons ahead of that period last year.

Beet sugar processors reduced their prices $.20 per 100 pounds, effective September 1st, in Chicago-West and Texas-Oklahoma territories, making the basis price $8.95. Zone delivered prices also were withdrawn on September 1st. Deliveries thereafter will be made at basis price plus destination prepay.

Sugar Prices—September 2, 1960

Ex. Duty Raw Sugar NY	**6.05**
Average #6 Raw Sugar Jan. 1 to Sept. 2	**5.69**
Refined Sugar Gross N.Y.	**9.70**
#4 Raw Sugar (f.o.b.) Cuba	**3.25**
Average #4 Sugar Jan. 1 to Sept. 2	**3.09**

Future Prices	*Contract #6*	*Contract #4*	*Contract #7*
November 1960	**6.03**	**3.19**	**6.55**
March 1961	**5.93**	**3.13**	**6.38**
May 1961	...	**3.15**	...

World (#4) spot raw sugar prices declined rather persistently from 4.30¢ per pound at the beginning of August to 3.25¢ on September 1st.

Cuban sales to the world market (outside U. S.) through August 31st were 4,354,983 short tons, according to a survey by Willett & Gray, Inc. However, sales in July totalled only 72,168 short tons, B. W. Dyer & Company points out.

Bagasse-Paper Mill For Hawaii

HONOLULU, SEPTEMBER 1: A 100-ton per day paper mill, suitable for Hawaiian production—using 100% bagasse fiber—has been designed. Final go-ahead awaits an economic evaluation of costs, which will probably not be completed until the end of the year.

To date, the Hawaiian Sugar Planters' Assn. and Crown-Zellerbach Paper Co. has spent some $1.5 million on research. The project was started eight years ago by the Experiment Station, HSPA. Initially, it centered on the feasibility of making paper from 100% bagasse. Later, Crown-Zellerback joined in the study as to commercial manufacturing processes. Their large research facilities at Camas, Washington were utilized.

According to Frederick Simpich, vice-president of Castle & Cooke, Ltd. who headed the HSPA's committee on by-products, the research recently completed has resulted in solution to all technical problems involved.

However, making paper in Hawaii involves two problems not common to many areas now using begasse for paper making. These are: making paper with 100% bagasse fibers; and competition with high U. S. paper standards.

Other sugar areas making paper add wood fibers to bagasse to give greater strength, and even then they do not come up to U. S. standards, Mr. Simpich says. Hawaii does not have the wood fibers to add, however, the Crown-Zellerbach tests have resulted in several successful grades of paper of competitive quality, made 100% from bagasse.

The 100-ton plant, which is about the smallest commercially feasible mill, would produce more paper than Hawaii can use, so additional markets must be sought to be able to use the full capacity.

Mr. Simpich reports that there is a "staggering" overcapacity of world paper production. This is somewhat of a chronic condition in the industry, but in certain marketing areas this does not prevail. He says that overproduction alone will not be enough to rule out a paper mill in Hawaii—if all other economic factors are favorable.

Some planners foresee the possibility of paper mills on each of the four major Hawaiian islands producing sugar, however, sugarmen would be pleased to see even one paper mill become a reality.

It is interesting to note that while Hawaii ponders the economics of paper making

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Value of the Cellulose in 1 Ton of Bagasse (Dry Basis)	$ 83.50
Value as Fuel of 1 Ton of Bagassse (Dry Basis)	$ 4.55
DOLLARS BURNED PER TON OF BAGASSE (Dry Basis) In U. S. A.	$ 78.95

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With the longest and most successful experience in the field,—owners of the only process that enables the UNIFORM purification of Bagasse Cellulose to 99.3% Alpha Purity,—and with the highest references from Official United States Government Committees, Government and Commercial Laboratories and many other Experts.

* "Paper for Printing" Today and Tomorrow, by the Intelligence Unit of The Economist, London. Presented jointly by UNESCO and FAO.

** A study of newsprint expansion, a process report by the United States Department of Commerce to the Committee of Judiciary, House of Representatives (U. S. Printing Office 1952).

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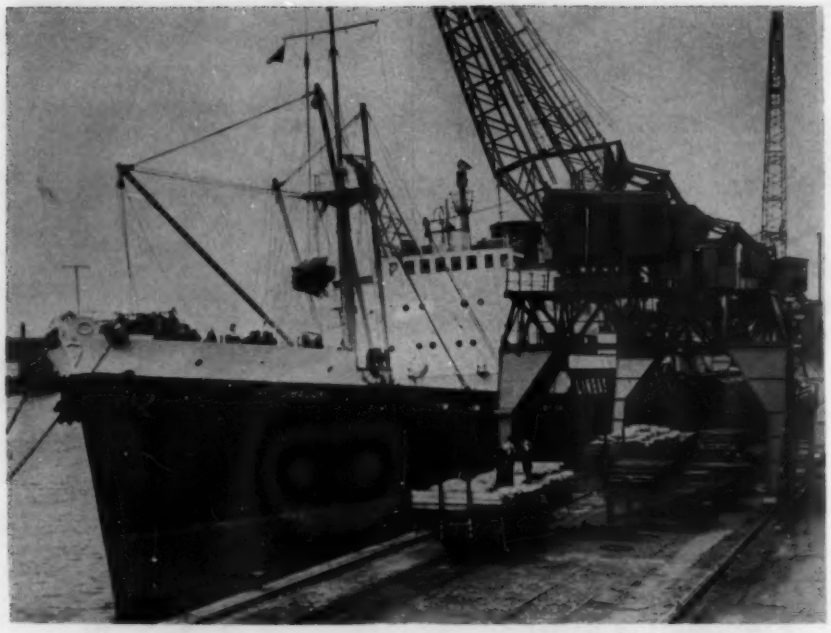

Cargo of Cuban raw sugar arrives in Soviet Union. With Cuban colors flying, the ss. Rio Jibacoa delivers a cargo of bagged raw sugar to the Russian Baltic Port of Klaipeda, as part of the five year agreement to supply sugar for machinery and credit. ©Sovfoto.

from bagasse the Coordinator General's Department of Queensland, Australia, reports that production of paper from bagasse at Mackay would be uneconomical.

According to a recent *Producers' Review* article, the department states that comparative tonnages and cost of production between bagasse and eucalyptus pulp is the basis of the decision.

The Mackay district has six sugar mills with an annual bagasse surplus of 100,000 tons. The Australians say this could form the basis of a small paper manufacturing plant capable of producing 20,000 tons of pulp annually. (About five tons of bagasse are required to produce a ton of pulp—and the Australians add about two tons of eucalyptus, or wood, fiber.)

Hawaii's sugar industry usually runs smoothly with little complaint of company management. However, a local protest has now been registered. Harold W. Rice, longtime maverick among Hawaii's "sugar baron" families, recently announced that he was seeking proxy control of the Hawaiian Commercial & Sugar Co.—largest U. S. sugar plantation—and wants to oust the manager and assistant manager.

Asa F. Baldwin is president and general manager of the huge Maui island plantation, and Frank C. Churchill is the assistant manager. HC&S can be classified as one of the most research-minded organizations in the sugar world. For example, they have a project underway to pump harvested cane through pipes from harvest fields to the mill. Mr. Rice takes a dim view of such things and says HC&S should put "an outstanding farmer" in charge and not leave the growing and ripening of cane to engineers.

The 76-year old Rice has been in the middle of other Hawaiian controversies. With an older brother, Charles A. Rice, feuding has gone on with ruling families in the industry, at infrequent periods, for years. Not too many years ago Harold Rice battled to get on the board of directors of Lihue Plantation Co. and Pioneer Mill Co.

In his attack on HC&S he sent letters to more than 3,000 stockholders charging mismanagement and waste. He calls for a "complete change of management" and production by "qualified farmers and not by engineers with slide rules."

The company lost $223,007 last year, and $267,152 in 1958. It earned $1.4 million in 1957.

Mr. Rice recommends abolition of the plantations' development systems of the engineering section, incentives and standards groups, training and public relations. He says by these and other measures, overhead can be cut by $1 million a year.

The attack is not taken too seriously in local sugar circles. According to the company's stockholder list, Mr. Rice owns 15 of 2,350,000 shares of stock in HC&S. He says he controls "indirectly" about 44,000 shares and his brother Charles has 10,000 shares of company stock.

It probably amounts to little, but the challenge to authority in the Hawaiian sugar industry is news.

C. Brewer & Co., which has 10 subsidiary sugar plantations in Hawaii, has announced a $3,100,000 budget for projects to improve plant and property during 1960-61. This is $200,000 less than that approved for the past fiscal period, however, there is a carry-over budget of $1,075,000 for items approved in previous years.

The factory budget is $505,000 versus $525,000 last year. Over half of the money is to be spent by Hawaiian Agricultural Co. to install a Gruendler shredder, a 2,500 KW generator, and a primary heater. These items are part of a long-range program of increasing factory capacity to process a larger crop.

At Paauhau Sugar Co., a new mill yard carrier is authorized. At Olokele Sugar Co., a variable speed carrier and other types of factory automation are in the modernization program.

Irrigation expenditures are up. This year some $135,000 is authorized versus only $50,000 a year ago. Paauhau and Kilauea Sugar Co. are both adding two more portable overhead sprinkler units. The success of overhead irrigation is indicated by continued expansion.

The field mechanization, $270,000 has been approved, $80,000 more than the previous year. This includes two dump body cane trucks for Olokele Sugar Co. This is the only plantation in Hawaii using dump trucks. Two cane trucks of the more widely used side unloading type, are to be leased for Hilo Sugar Co. and additional trucks secured for Wailuku Sugar Co. and Kilauea. A new Hilo unloader will be installed at Paauhau.

Hakalau Sugar Co. will buy a rotovator plow, the third Brewer company to purchase such equipment. Improved V-cutters (mechanical cane cutters) will be purchased by Onomea Sugar Co. and Paauhau to replace worn out units. Paauhau will also purchase a new push rake that can be used interchangeably with the V-cutter on the same tractor. Olokele is purchasing a direct mounted plow for its D-9 tractor and land planer, for improving the contour of land for easier irrigation.

The lease-rental budget is $500,000 this fiscal year, down some $400,000 from last year.

Kawaihae, the new bulk sugar and molasses port in Hawaii which was completed almost a year ago, finally sent out the first shipment of sugar at the end of July. A union dispute involving the International Longshoremen's and Warehousemen's Union has kept the $7 million port closed.

The new port receives, stores and ships sugar and molasses from Kohala, Honokaa and Hamakua plantations, on the Island of Hawaii.

Hawaiian plantations have been warned by Representative Daniel K. Inouye, member of the U. S. Congress from Hawaii, that they are too big and should seriously consider cutting themselves up into smaller units. Compliance payments, which are paid as part of the U. S. sugar act to domestic producers, is the cause of this recommendation.

Already there is a sliding scale on payments which penalize all Hawaiian plantations, because of the quantity of cane each company produces. Representative Inouye feels that this restriction may be tightened, or a definite ceiling placed upon amount of payments any single producer can receive.

There is no immediate indication that changes in the structure of the sugar organization are being considered.

Louisiana Crop Greatly Improved

NEW ORLEANS, SEPTEMBER 6: The weather in the Louisiana sugar district showed considerable improvement during the month of August and we asked Gilbert J. Durbin, General Manager of the American Sugar Cane League, to give us his ideas concerning the crop as it begins the last quarter of the corp year. Mr. Durbin advised us as follows:

"The Louisiana sugar cane crop made better than normal growth during August but is still shorter in height than it should be at this time of year. In general, the number of stalks per acre is greater than last year. With continued good growing weather, the cane crop may turn out to be a fairly good one.

"The prolonged cold weather during the early months of the year caused the cane crop to get off to a late start. The dry weather during May caused the cane to sucker well, resulting in a good stalk population. Continued dry weather in June and into July seriously retarded growth. That situation made the favorable growing conditions in August especially welcome.

"Cane which has the stunting disease is very short this year. Growers who are not controlling this disease should certainly start this fall. Heat treatment of seed cane kills the virus which causes stunting disease.

"Mosaic is another disease with which cane farmers must contend. County Agents conducted many demonstrations in cane fields this year to show growers how to identify mosaic and how to rogue out diseased plants. Farmers who followed their County Agents' instructions have good seed cane to plant now."

The month of September is usually the time that the planting operations are conducted in the Louisiana sugar district. This year it appeared that these operations would be delayed because of the slow progress made by the crop during the early growing season but apparently the growth registered during the month of August has produced cane of sufficient height for planting. Lloyd L. Lauden, Agronomist of the American Sugar Cane League, reports that planting operations will be about normal this year, weather permitting, with most planting operations completed before October 1st. Mr. Lauden has urged growers to do a good job of planting reminding them that what is done during this year's planting operations will affect not only the plant cane crop of 1961 but the stubble crop from this planting for the next two years that follow.

It is interesting to note that a census of the more important commercial sugarcane varieties in Louisiana shows that C.P. 44-101 occupies 48.01% of the acreage planted in sugarcane, followed by N.Co. 310 with 21.03%, C.P. 36-105 with 10.32%, C.P. 48-103 with 4.01%, C.P. 36-13 with 2.62% and C.P. 47-193 with 2.72%. The census states that C.P. 47-193 is listed first for heavy soil types because it is earlier maturing. It does not withstand freeze injury, however, and should be harvested early during the harvesting operations.

The American Sugar Cane League has announced that a special meeting of its membership will be held on September 29th at 10 o'clock in the office of the Corporation, 414 Whitney Building, New Orleans, Louisiana, to amend its charter as follows:

1. Change the number of members of the Executive Committee to not less than twenty nor more than forty, and until otherwise provided in the by-laws to fix the number at thirty-four, each being entitled to one vote, and to increase the number of committeemen to constitute a quorum.
2. To provide for the election of all officers by the Executive Committee.
3. To revise the procedure for calling special meetings of the Executive Committee and to provide that meetings of the Executive Committee may be held any place in Louisiana designed by that Committee.

Effect of U. S. Purchasers In Mexico

MEXICO CITY, SEPTEMBER 1: The shipment of 399,540 tons of Mexican sugar to the United States, in the July-December period, is hailed in sugar circles as "the salvation of the industry." Sugar exports move up to third place in importance in Mexican exports, exceeded only by cotton and coffee, producing an income of around 650 million pesos ($52,000,000).

Mexico also is preparing to ask the International Sugar Council to boost its world quota from 75,000 metric tons to double this figure.

However, the American news, although good, has various reprecussions here. Some quarters state that the industry's situation is improved only this year, since there is no assurance that the U. S. will continue to buy in same quantity; may revise its quotas for sugar supplying nations again.

With Mexico moving up to fifth position as far as production is concerned, the National Union of Sugar Producers stated that within two years the republic may not have any surpluses. Production will go higher, and the industry's problems will be resolved. Export of around 400,000 tons this year will bring in dollars that will solve credit problems, give new life to cane cultivation and make possible initiation of a modernization program.

While the above is the Union's optimistic position, other sectors of the industry as well as certain federal officials talk of the "grave danger" that Mexico may face a sugar shortage next year, be unable to supply its domestic market, as a result of the increased American quota. Cane growers allege that production in the next cycle will be down, and not up.

Mexican consumption now stands at around a million metric tons a year, despite the low per capita consumption (about 56 pounds per capita although there are extremes in Tlaxcala, Quintana Roo, etc., where sugar consumption scarcely hits six pounds per inhabitant). With a crop of 1,500,000 metric tons this will not leave a very large reserve to cope with increased domestic demand reflecting population rise.

Observers also point out that production in the next cycle may drop by as much as 24%, with this primarily due to a 30% reduction in sugar cane caused by lack of credits and retarded rains. (The rains this year, for example, have been delayed as much as six to eight weeks in certain areas).

But the informed National Union of Sugar Producers, very bullish for the future, discards all adverse talk as "unfounded." The sugar industry, representing a 2,500,000,000 pesos investment ($200,000,000), and employing upwards of 300,000 persons, is now finally going to shake loose from stagnation and begin a real forward march of progress.

As for sugar surpluses, the Union pointed out that it cost producers 10 million pesos ($800,000) to store surpluses. With exports digging deep into these, warehouse rentals will drop substantially. Further, the Union's opinion is that Mexico's sugar industry is ready and capable of producing on a staggered upward scale, with this sufficient to meet internal demands for the foreseeable future, provide for export and leave a sufficient balance for reserves. An approximate 10 to 15% annual production boost would achieve this goal, the Union said.

New Sugar Mills in Romania and Spain

The Societe Fives Lille-Cail of Paris, France, is supplying $1 million worth of equipment for modernization of several sugar mills in Spain. Also this company is building two sugar factories at Bucecea and Ludus in Romania. Part of these installations will be manufactured in Romania from plans furnished by the above company.

SUGAR ABSTRACTS

Published under the Auspices of the International Society of Sugar Cane Technologists

by Special Arrangement with

SUGAR y AZÚCAR — Dr. O. W. Willcox, Editor

Technology

About Light-Electric Automatic Polarimeters

A. EMMERICH, *Zucker, Vol. 13, No. 6, pp. 148-153 (1960)*

The author describes the new polarimeters manufactured by the firm Carl Zeiss of Oberkochen; Hilger and Watts, London, and ETELCO also of London, and points to the importance of the rotational dispersion of optically active non-sugars with regard to determination of the polarization of commercial sugar products when using light of different wave lengths.

All these instruments depend on the wave length of the yellow-green mercury line, and therefore are not in agreement with the generally recognized definition of the international sugar scale set up by ICUMSA. The use of light of a different wave length raises the question of whether and to what extent the rotation dispersion of the optically active non-sugars will affect the evaluation of various sugar products.

The standard quartz plate that is the basic feature of the international sugar scale cannot be directly compared with the light-electric apparatus, because its sugar value changes with the wave length of the source of light employed.

The international sugar scale was created after long and difficult discussions, which finally led to its adoption throughout the world for measuring polarization. All apparatus with quartz compensation have the same scale; they work with the same lengths of polarization tubes, and the results are directly comparable. And now this hard won uniformity is threatened by the introduction of the new electric-light instruments. The most important task of ICUMSA in the near future will be to work out new principles that will enable the optical industry to provide the light-electric instruments with a uniform, instead of the different scales they now use. It must be recognized that the old type of polarimeter is obsolete, because its readings have a subjective rather than an objective basis as is now universally the case with modern photometers and colorimeters, and it is desirable that polarimeters themselves become objective.

■

Influence of Degree of Preparation on No. 1 Mill Performance

Sugar Research Institute, Mackay Technical Report No. 49 (1958)

The tests described were aimed to determine whether shredded cane offered any advantages over knifed cane insofar as it affects No. 1 mill performance. It was concluded—(1) shredded cane will yield 2% more pol extraction due to a reduction in reabsorption loss at the delivery roll. (2) There was no evidence of an optimum degree of preparation. (3) No evidence was found to indicate any influence on crushing rate, but it would seem that with some slight precompression of the feed, a small gain might result due to the higher bulk density of the feed. (4) There is an appreciable reduction in mill power required for a given extraction with shredded cane.

■

Steam Consumption in Remelting with Water or Clear Juice

CHS, G. M. PERK, *South African Sugar Journal, Vol. 43, No. 7, pp. 617, 619, 621 (1959)*

The S.A. Sugar Milling Research Institute comes up with a further discussion of whether remelting B and C massecuites with clear juice is more economical than with water. It is assumed that in either case the melt has a density of 72 Brix, and that the sugar boiling house is equipped with a straight quadruple effect which concentrates from 15° to 60° Brix. The calculations show that to make the melt per 100 tons of cane and evaporate it from 15° to 22° Brix, the requirements are:

	Water	*Juice*
Tons of steam per melt	0.633	0.068
Tons steam per quadruple	16,317	16,184
Tons steam for syrup	0.985	0.977

The difference is only 0.094 tons of steam from and at 212° F. per 100 tons of cane crushed. The saving of steam is thus very small and does not outweigh the disadvantage of the use of clarified juice for remelting purposes. A design of a suitable melter for the operation is given.

■

Rapid Deterioration and Destruction of Molasses in Storage

GUNNAR FROMEN AND EDWARD BOWLAND, *Sugar Journal, Vol. 22, No. 4, pp 20-27 (1959)*

This is a final report and summary of the spectacular destruction of several million gallons of molasses in storage by spontaneous ignition at Central Fajardo in Puerto Rico in 1953. The preponderance of all the evidence in hand points inescapably to over-the-critical-heat as the cause of this incident. No attempt is made to state what the critical-limit is for any particular case. "Safe Storage" temperature for one molasses may be decidely "unsafe" for another, depending on their natures. However, the authors are convinced that decompositions of the violent destructive type will never happen to any molasses if its tempera-

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ture is not allowed to exceed 105° to 110° F. This condition can easily be fulfilled by providing some circulation of the molasses in the storage tanks. This circulation may be effected by pumping from the bottom and discharging into the top of the same or another tank or tanks. It is said that in some cases molasses may be cooled by pumping compressed air into the bottom of the tank, but the authors much prefer circulating the molasses by pumping. Provision of equipment for continual recording of temperature in the molasses will be a help.

■

Clarification of Juice by the "Alrubar Process"

ALEJANDRO RUBIO BARO, *Oficial Boletin A.T.A.C. Vo. 27, No. 8, pp 535-537 (1956)*

It is pointed out that existing systems of purifying sugar cane juice, by the use of lime and heat, have the great inconvenience that these systems do not produce white sugar as it naturally exists in the cane stalks. The trouble is that when the crude juice is boiled after addition of lime, a part of the colloids and other impurities in the juice are dissolved, and these impurities mix with the sugar, from which white sugar is obtained with difficulty; besides that, there is a large loss of sugar by inversion.

The new process which avoids these difficulties, consists in coagulating the impurities in the cold; that is, at the ordinary temperature when the juice has passed the mill. It is next passed through a strainer to remove the bagacillo. Then some phosphoric acid to lower the pH to 3.5 and the juice is immediately alkalized to pH 7.3 to 7.5. Flocculation of the impurities takes place instantaneously. Separation of agglutinated impurities may then follow by mechanical means, preferably a centrifugal with a solid basket 48" by 26" at 1,200 r.p.m., which has given excellent results.

■

Low-Grade Crystallization and Sugar Recovery

Sugar Research Institute, Mackay Technical Report No. 56, (1958)

Since molasses viscosity is the major factor limiting the crystallization process in the sugar factory, a "target" purity is defined as the true purity of final molasses when the viscosity reaches the selected value of 1000 poises. This bears a close relationship with R.S./Ash ratio of the molasses. Studies were also made of the value of cooling B massecuites: a purity drop of four units was recorded when the massecuite was held at final pan temperature for two hours. Cooling effected a further drop, but this might affect the purity of the B sugar at the fugals.

■

Agriculture

Breeding Sugar Cane for Resistance to the Top Borer (Scirophaga Nivella F.)

H. CHANG and C. Y. SHIH, *Report Taiwan Sugar Experiment Station, No. 19, pp. 53-66 (1959); English abstract.*

The fact that cane varieties characterized by strong and hard mid-ribs are resistant to the top borer was reported by Isaac in 1939 and again in 1947 by Rao in India. This has now been confirmed by an extensive investigation in Taiwan. This resistance is determined by two inheritable structural features, (1) the thickness of the upper and lower epidermis of the cane leaf mid-rib, and (2) the density (or number and diameter) of the paremchymatous cells of the mid-rib. These two characters together supply resistance to borer attack. The correlation coefficient for percentage of damage to the plants is about r=.8600.

■

Experimentation on Rooting Sugar Cane Seed Pieces by Treatment with Hormones

EDIERSON ERASMO DO AZEVEDO, *Brazil Azucarero, Vol. 53, No. 1, pp. 16-34, 1955*

Two experiments are reported, one with indolacetic acid and the other with indolbutyric acid. In this work the object was to determine whether the hormones would have any stimulating effect on the formation and development of primary roots from the root-rings of the stalks. The solutions used were in four strengths: 0.001 gram to 0.01 gram per 100 grams of water. The variety used was Campos Brasil 36-14. The method of operation was to soak the 3-node sticks in the hormone solutions for periods of 12 to 24 hours and then plant them upright in moist sand. After five days the sticks were carefully lifted out, cleaned with a water jet, classified as not rooted, weak, good or optimum rooting, and carefully replanted in the same sand. After six months the stalks were again lifted, the sand was washed away and the roots again inspected. The rooting of the sticks treated with indolacetic acid was 80 to 100% perfect; the rooting of those treated with indolbutyric acid was barely 20%. The extent of rooting was in direct proportion to the duration of the soaking and to the concentration of the hormones. Obviously, indolbutyric acid is unsuited for the purpose.

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Booker Brothers Buy Innswood In Jamaica

An event of considerable importance to Jamaica's Sugar Industry occurred recently when it was anounced that the firm of Booker Bros McConnell & Co. Ltd. had purchased a majority interest in the capital of Innswood Estate Ltd. in Jamaica. Innswood's estimated production of sugar in the current crop is 18,000 tons. The Estate has been managed by a group of Trustees since the death of its former owner, Mr. Edwin Charley. Mr. Horace Campbell will continue as Manager of the Estate and has also been appointed a Director of the new Booker/-Innswood partnership.

Booker Bros. are already represented in Jamaica through their ownership of Tia Maria, but this is their first participation in Jamaica's sugar industry. It is felt by all members of the Sugar Industry of the Island that the entrance of Bookers into Jamaica's Sugar Industry, can only redound to the advantage of the industry. It will be the means of putting at the disposal of Jamaica's Sugar Industry the wide and varied experience that this Company has accumulated in growing and harvesting cane in British Guiana where Booker Bros. are responsible for the production of over 250,000 tons of sugar a year.

It is of interest that Booker Bros. McConnell & Co. Ltd. are at present conducting an investigation in partnership with the Nigerian Governments into the possibility of developing a sugar industry in Nigeria.

■

F. O. Licht's Yearbook

The 22nd edition of F. O. Licht's International Sugar-Economic Yearbook and Directory for 1959-1960 in four languages (English, German, French and Spanish) is now available. The contents include a synopsis of German sugar legislation; the full text of the International Sugar Agreement; lists of commercial and professional associations in Germany and other countries; scientific institutions engaged in sugar research; an up-to-date list of all sugar brokers and agents for export and import of sugar throughout the world; complete lists of all commercial beet sugar and cane sugar factories and refineries, their owners, managers, location and in many cases their equipment and production. A large section of the book describes the activities of German sugar machinery manufacturers and their contributions to sugar Technology. A special article gives a detailed description of what is regarded as an ideal German beet sugar factory, and another article describes the extension of beet sugar production in subtropical regions. World-statistics of production, consumption, prices, export and import are given in a separate 60-page folder.

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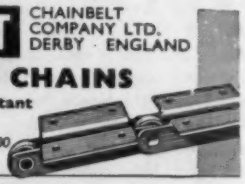

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Eliminating Discolorization In Portuguese East Africa

By J. Dos Santos Ilha,
Usine Bom Jesus, Luanda Angola, Portuguese East Africa

MANY cane sugar factories that practice the sulfitation process generally convert 30 to 50% of their total production into white sugar. In the passage of time this sugar tends to become yellowish. At the Bom Jesus factory, studies have been made to ascertain the causes of this yellowing, and the following conclusions have been reached.

The most important of the factors responsible for this discoloration is ferric salts of iron which exist in the cane juice. When the juice is treated with lime, these ferric salts are not precipitated, as one might expect, but are kept in suspension, or are "chelated" by certain organic acids contained in the juice; and when, after the liming, the juice sulphured the chelates (ch) are broken up, the ferric iron they contain is reduced to the ferrous condition, and remains in the juice as a colorless impurity. During the subsequent factory operation some of this ferrous iron is occluded in the sugar crystals; when the sugar is dried in contact with air the ferrous iron is reoxidized to the ferric condition and the sugar is discolored. The fact may be mentioned that this does not occur in factories that treat their juices by ion-exchange. It is also a fact that when a first massecuite is subjected to a treatment with sodium hydrosulfite or "Blankit," this substance does not react on all organic coloring materials in the juice and consequently there is further occasion for discoloration by reoxidation.

From these considerations it was plain that it would be necessary to eliminate the ferric iron in the form of ferrous hydrate, $Fe(OH)_2$. This is now being done by treating the juice with industrial calcium superphosphate having the composition PO_4HCa, SO_4Ca, and then alkalizing the juice to pH 8.0 with milk of lime. In this operation the following reactions occur concurrently:

(1) $XFe(CH) + SO_4Ca = XCa(Ch) + So_4Fe$

(2) $PO_4HCa + SO_4Fe = PO_4HFe + SO_4Ca$

(3) $2PO_4HFe + 5Ca(OH)_2 = (PO_4)2Ca_3 + 2Fe(OH_2) + 2H_2O$.

In the third reaction the ferrous iron is precipitated as PO_4HFe, and the juice is then sulfured to pH 6.4 or 6.8.

The tricalcium phosphate formed in this reaction is a powerful electrolyte which facilitates the settling by entraining the albuminous matter leaving the juice brightly clear. A great improvement in the work of the Oliver filter and a decrease in the pol of the filter mud has also been observed. There is a saving of time due to the more rapid filtration. Another consequence is a decrease of incrustation in the double effect.

Hydrosulfite F2 instead of Blankit is now being used for treating first strike massecuites; this eliminates coloring materials, both organic and inorganic, by reduction. During the 1959/1960 campaign at Bom Jesus it has been possible to obtain white sugar comparable to that produced by the carbonation process.

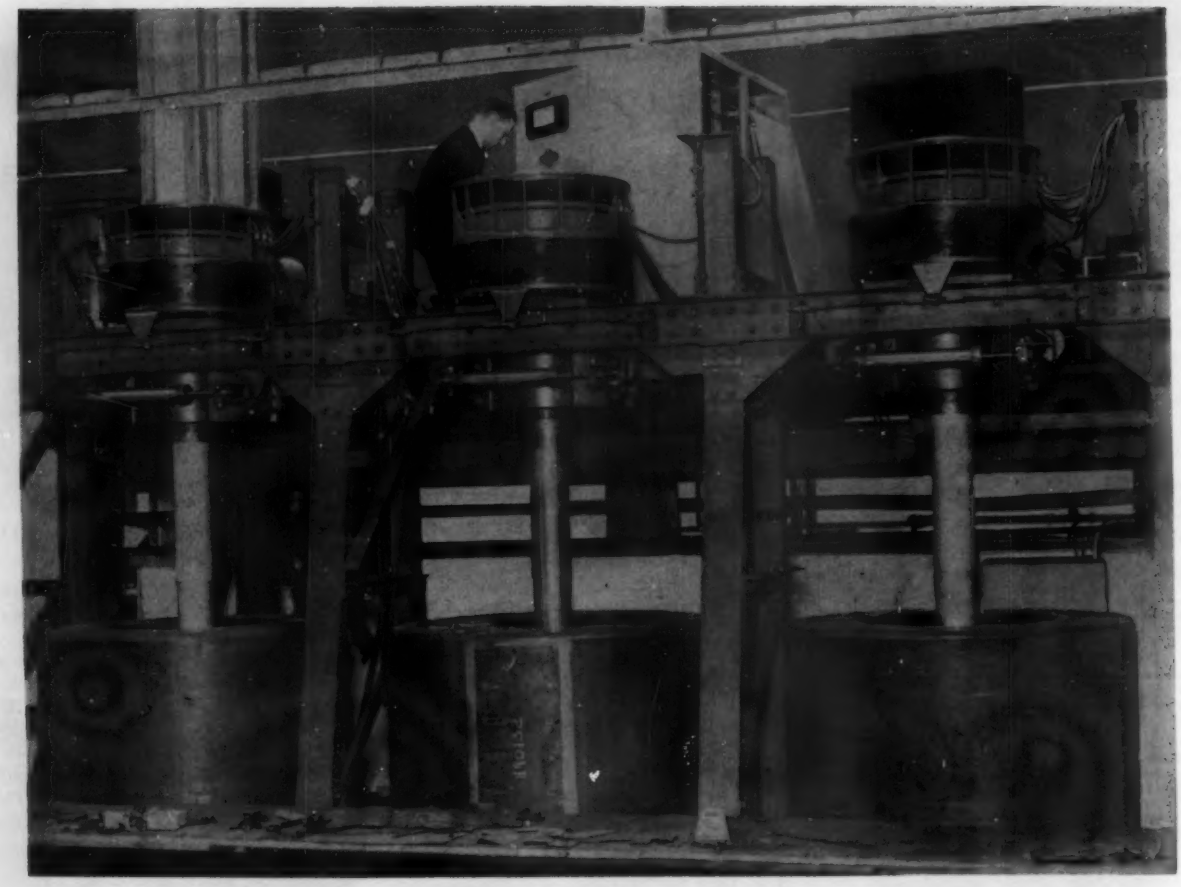
■

Hawaii—The First Year Of Statehood

The current position and future outlook for business conditions, urban development, agriculture and economic potentials in Hawaii was analyzed by Dr. James H. Shoemaker at an Advertising Club luncheon on August 19th in New York City. Dr. Shoemaker is Hawaii's leading economist, vice president of the Bank of Hawaii and a former professor of economics at Harvard. While the discussion covered all phases of industrial activity in Hawaii, some particularly interesting figures were given on the relative position of the sugar industry. For example, sugar still ranks first in income producing activities of the Islands, value of production for 1959 being given as $130,998,000. Normally this value would be of the order of $145,000,000 but the sugar crop is still suffering from the disastrous strike of 1959. This figure compares with the value of the pineapple crop of $127,000,000 and with the value of all other agriculture including livestock of $43,374,000. Tourist expenditures in Hawaii, another principal source of income was $109,000,000.

Total population of the Islands is estimated at 621,495 of which 14,036 are employed in the sugar industry; 64% in field work, 25% in the mills and 11% in administrative duties. Total area of the Islands is 4,118,400 acres of which 80% is unsuitable for intensive agriculture.

During the past year the economic growth rate in Hawaii has been approximately 10%. Dr. Shoemaker foresees a continued healthy growth but at a somewhat lower rate than 10% per year. The sugar industry appears to be gradually approaching a levelling off in production but may be expected to develop new by-products.



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Primera Campaña Remolachera en Pakistán

Por H. Kampf

Doctor en Ciencias Técnicas, F.R.I.C.

La primera campaña remolachera en la historia de la industria azucarera de Pakistán se terminó el 2 de julio de 1960, con la producción de 2,420 toneladas cortas de azúcar blanca en el Central Charsadda en el norte del Paquistán Occidental. El rendimiento promedio fue de 9.02%, a base de 26,750 toneladas cortas de remolacha rebanada. La siembra tuvo lugar en noviembre de 1959, y la sección dedicada a la remolacha, como parte integral de la fábrica de azúcar de caña, comenzó a rebanar el 15 de mayo de 1960.

El origen de esta operación única data de más de 40 años. Los primeros intentos para establecer una industria remolachera en esta región fueron emprendidos en 1914 en la Provincia Fronteriza Noroccidental de la India, ahora la parte septentrional del Pakistán Occidental. Un informe del Comité Indio Azucarero que se publicó en 1920 declaró que se había cultivado la remolacha experimentalmente en la estación agrícola de Tarnab, en el valle de Peshawar, durante los seis años anteriores. En el informe se expresaba que, durante estas seis temporadas de molienda, el rendimiento por acre nunca había sido menor de 18 toneladas cortas, excediendo generalmente las 22 toneladas. El Comité llegó a la conclusión de que "la remolacha puede ser cultivada con éxito y económicamente en la Provincia de la Frontera Noroccidental."

Hace unos pocos años, se reanudaron estos estudios en los centrales Charsadda y Premier en esta misma región, ahora el norte del Pakistán Occidental. (Véase Sugar y Azúcar, página 50, Junio de 1959, "Establecimiento de la Industria Remolachera en Pakistán" y página 72, Enero de 1960, "Remolacha y Caña en Pakistán Occidental").

La necesidad de ampliar la industria azucarera pakistana radica en el hecho de que este es uno de los pocos países en el mundo donde aun persiste el racionamiento de azúcar. Implantado durante la Segunda Guerra Mundial, se ha mantenido en un esfuerzo por economizar $6,000,000 en divisas que se necesitarían para la importación de azúcar. El racionamiento es severo; sólo se permite 1¼ libras por mes para cada persona en las ciudades, y solamente 10 onzas por persona durante el mes en las áreas rurales. Aun esta pequeña ración ha sido reducida en un 25% hasta el comienzo de la próxima cosecha de caña a fines de 1960.

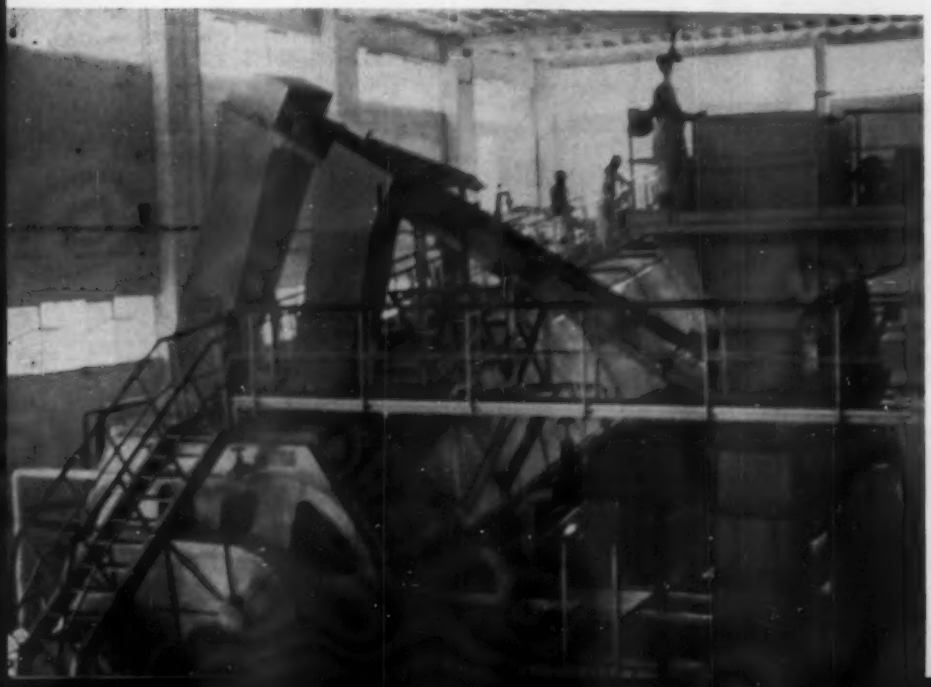
La producción de azúcar blanca de caña ha disminuido en 32,000 toneladas cortas de la cosecha de 1959 a la de 1960. La producción de azúcar de los catorce ingenios de azúcar de caña en Pakistán llegó solamente a 156,000 toneladas cortas de azúcar blanca en la cosecha de 1959 a 1960, comparadas con 188,000 toneladas cortas en la zafra anterior. La caña molida llegó a un total de 2,120,000 toneladas cortas, comparadas con 2,260,000 de toneladas en 1958/59. El rendimiento había descendido de 7.943% a 7.377% en la última cosecha. La reducción en la producción azucarera se debió a heladas y a un prolongado período de frío y condiciones de tiempo desfavorables durante la época de cultivo y recolección. Cada uno de los tres modernos centrales en el valle de Peshawar, en el norte del Pakistán Occidental tuvo que elaborar caña dañada por las heladas. La Tabla 1, que se acompaña, muestra los resultados comparativos de las cosechas de 1958/59 y 1959/60.

Tabla 1

(toneladas cortas)

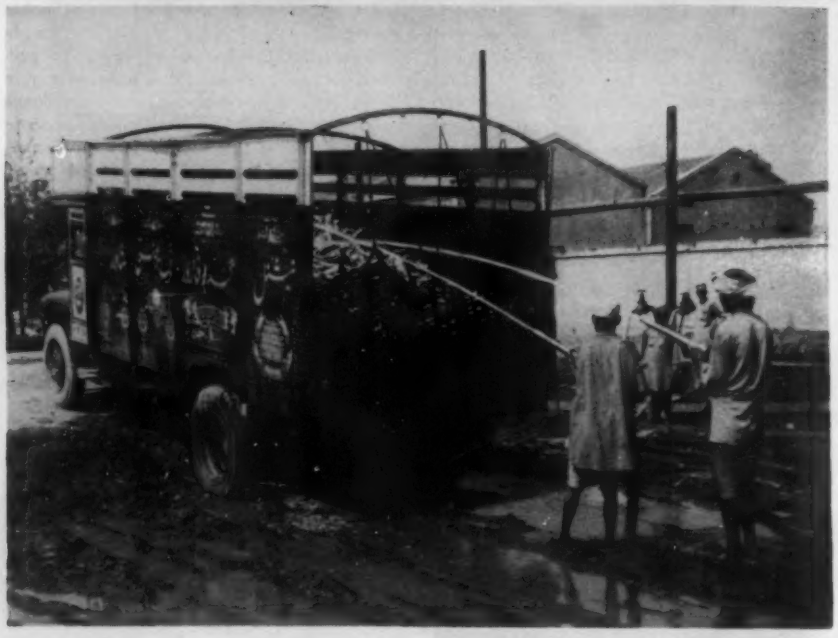
	1958/59 Producción de Azúcar	Rendimiento %	1959/60 Producción de Azúcar	Rendimiento %	Merma
Premier	45,600	7.289	30,200	6.540	15,400
Charsadda	24,900	7.201	19,900	7.095	5,000
Frontier	18,300	7.738	14,900	6.775	3,400
				Merma Total	23,800

El "Segundo Plan Quinquenal" de Pakistán, que abarca el período de 1960 a 1965, destinado a acelerar el desarrollo de la agricultura y la industria, incluye un plan para aumentar la producción de azúcar blanca a 425,000 toneladas cortas al año para 1965. Esto, por lo menos, satisfaría el actual consumo controlado. Debido a las condiciones climáticas desfa-



El difusor D.d.s. en el Ingenio Charsadda, según se muestra a la izquierda, con el tanque de escaldar a la derecha. El equipo ha sido comprado en Alemania a tiempo para la molienda de remolacha de mayo a julio de 1960.

La fabrica combinada de azúcar de caña y remolacha del Central Charsadda, en el Norte del Pakistán Occidental.



Durante los primeros experimentos en la elaboración de la remolacha no hubo lavadoras mecánicas disponibles, de aquí que la remolacha tuvo que ser lavada en el camión, según se muestra.

vorables en el norte del Pakistán Occidental, el plan recomienda que se extienda el cultivo de la caña en Pakistán Oriental y las regiones meridionales del Pakistán Occidental, las cuales son, por su clima y posición geográfica, más apropiadas para esta siembra. Además de los planes para la expansión de la industria de azúcar de caña en estas áreas, se incluyen recomendaciones para la producción de azúcar de remolacha en los distritos de Mardan, Charsadda y Peshawar y en la región de Quetta, cerca de la frontera irania.

En el central azucarero Charsadda, donde recientemente finalizó la primera molienda de remolacha, el ingenio de azúcar de caña entró en producción en 1956. Dicho ingenio fue diseñado y construído por la Buckau R. Wolf, de Grevenbroich, Alemania. La maquinaria para la fábrica de azúcar de remolacha fue suministrada por la misma compañía. Después de terminada la molienda de 282,000 toneladas cortas de caña el 15 de Mayo de 1960, comenzó a trabajar la sección dedicada a la remolacha. Aunque el rendimiento de 9.02% estuvo por debajo de los resultados obtenidos en otras áreas de producción remolachera, se consideró alentador en comparación con el rendimiento de 7.095% en el ingenio durante la molienda de la caña.

Durante la molienda de remolacha en mayo y junio de este año, las temperaturas en Charsadda fueron durante el día de 105° a 110° F. y las nocturnas fueron de 75° a 85° F. No se experimentaron dificultades con estas temperaturas siempre que la remolacha sea manipulada sin demora. Bajo estas condiciones de temperatura, debe evitarse el prolongado almacenaje de la remolacha.

La fábrica de azúcar de remolacha utiliza un difusor D.d.s. Para la purificación del jugo, se modificó ligeramente la carbonatación-sulfitación doble de Haan, utilizada en el ingenio de azúcar de caña. Polvo de blanquear o SO_2 fue mezclado con el agua en la lavadora de remolacha. La sumersión en un tanque de escaldar precedió a la difusión principal y la predefecación se llevó a cabo en un aparato Brieghel-Mueller.

La remolacha fue cultivada en unos acres por un gran número de campesinos pakistanos, habiéndose importado la semilla de Europa. Alrededor de 3½ toneladas de semilla de remolacha se trajeron de Kleinwanzlebener Sastzucht en Alemania, 12 toneladas de Agrimpex, en Hungría, y cantidades más pequeñas de Francia, Holanda e Italia. La siembra tuvo lugar a fines de noviembre de 1959 y se utilizaron alrededor de ocho libras de semilla por acre. Las heladas que causaron daño a la cosecha de caña, no estropearon la de remolacha. El contenido de azúcar de la remo-

Un saco de semilla de remolacha entregado en Pakistán en noviembre de 1959. Cientos de campesinos sembraron la semilla y cultivaron y recogieron la cosecha de remolacha.

El Primer Fitotrón en Australia

Construye la Colonial Sugar un Centro de Investigación Agrícola

A FIN de obtener conocimientos básicos acerca de la fisiología de la planta de caña de azúcar, la Colonial Sugar Refining Company está construyendo un enorme centro moderno de investigación que ocupará tres acres de terreno en Brisbane, Australia, el cual se conocerá como el David North Plant Research Centre (Centro de Estudios Agrícolas David North), en homenaje a David Shepherd North, funcionario retirado de la compañia y precursor en el campo de la investigación de la propagación de la caña y el control de sus enfermedades.

De acuerdo con unas declaraciones del Dr. James Vernon, Administrador General de la C.S.R., se calcula que costará £300,000 establecer y £40,000 al año operar el Centro.

El establecimiento del Centro de Investigación forma parte de planes a largo plazo de la Colonial para mejorar las variedades de caña. Los conocimientos obtenidos deberán servir a los expertos en propagación de plantas para cultivar cañas con más alto contenido de sacarosa, con períodos prolongados de máximo de sacarosa, rindiendo jugos de fácil elaboración, y posiblemente para obtener variedades más erectas que serán más fáciles de recoger mecanicamente. La Colonial Sugar Refining Company está ya invirtiendo más de £200,000 anualmente en investigaciones. Aunque la C.S.R. no cosecha caña comercialmente en Australia y sólo lo hace en muy pequeña escala en las Fiji, se tiene el propósito de que los resultados de los trabajos de investigación se pongan al alcance de los cosecheros de caña independientes en Australia y las Fiji. De esta manera se espera reducir el alto costo de la producción de azúcar en Australia, a fin de mantener la azúcar a bajo precio en el mercado doméstico y sostener una posición fuerte en el mercado mundial. Los trabajos de investigación encaminados a aumentar la eficiencia y disminuir los costos por tonelada de caña y de azúcar deben proseguir si la industria va a ser competitiva y económicamente viable en el futuro.

El Centro de Investigación será dirigido por el Dr. K. T. Glasziou, quien se unió al personal de la Colonial Sugar Refining Company en 1955 como fisiólogo de plantas. El Dr. Glasziou prestó servicio en la R.A.A.F. durante la guerra y posteriormente se ocupó en trabajos agropecuarios en Nueva Zelandia. En 1950 se matriculó en la Facultad de Agricultura de la Universidad de Sydney. Un año más tarde cambió a la Facultad de Ciencias y se graduó en bioquímica con honores de primera clase a principios de 1955, ganando el premio "Roslyn Flora Goulston" para bioquímica y el "GP Ltd." para bioquímica y farmacología. Obtuvo el grado de Maestro en Ciencias en 1956 y su Doctorado en 1958. El Dr. Glasziou trabajó tambien como investigador en el Instituto Tecnológico de California y posteriormento trabajó con el Dr. G. O. Burr en la Estación Experimental de la Asociación Hawaiana de Cosecheros de Caña.

La característica principal del David North Plant Research Centre será un fitotrón que constará de cierto número de invernaderos con aire acondicionado y cámaras especiales en las cuales muchos aspectos del ambiente serán sometidos a un rígido control. Las condiciones en algunos de los cuartos serán controladas hasta un grado tal que, para impedir la contaminación por insectos y microorganismos, al personal que trabaja en el proyecto, asi como a los visitantes, se les exigirá lavarse y cambiar de ropa antes de entrar en el Centro.

Se espera que el fitotrón en el Centro de Estudios Agrícolas David North entrará en operación durante 1961, siendo el primero en Australia y el quinto en el mundo. Así mísmo será el primero dedicado exclusivamente a la caña de azúcar y el primero destinado a una sóla siembra.

El fitotrón eliminará la mayoría de los factores variables que dificultan los experimentos en el campo y hará innecesarios los complicados procedimientos estadísticos en los trabajos experimentales. El mismo será utilizado para poner en ejecución un programa de investigación básica en cuanto a la fisiología, la bioquímica y la genética de la caña de azúcar. Como en todas las investigaciones básicas, el objetivo será poner al descubierto nuevos conocimientos, pero el principio orientador para seleccionar líneas específicas de investigación será la posibilidad de obtener resultados encaminados a reducir el costo de la producción azucarera.

En los trabajos iniciales se estudiarán las principales variedades comerciales de caña de azúcar y cierto número de variedades seleccionadas que interesan al experto de propagación de la caña. El objetivo será determinar el efecto de los factores ambientales, tales como las temperaturas del aire y de las raíces, intensidad y duración de la luz, nutrición mineral y regimen de agua, en los promedios de crecimiento de las plantas y el rendimiento de azúcar. Análogos estudios se efectuarán en cuanto al movimiento y almacenaje del azúcar dentro de la planta y en cuanto al mecanismo para síntesis y conversión. Para este trabajo se compararán variedades de caña que varían mucho en contenido de azúcar y plantas que pertenecen a géneros afines. La herencia de algunos de los factores relacionados con el crecimiento y la producción de azúcar, será estudiada utilizando los ambientes controlados que proporciona el fitotrón. Así mísmo será posible usar técnicas para estudios genéticos que no son facilmente asequibles a los que propagan las plantas y trabajan en campo abierto.

Es sabido que el florecimiento de la caña está fuertemente influenciado por la duración del día, la calidad de la luz y las temperaturas nocturnas, siendo los requerimientos de cada uno de estos factores muy especificos. Para cruzar dos variedades es esencial que éstas florezcan al mismo tiempo. El género *Saccharum* incluye diferentes especies de caña de azúcar, las cuales florecen en distintas épocas del año, a veces raramente y sólo en lugares favorables. Para facilitar el trabajo en la propagación de nuevas variedades de caña, se investigará el florecimiento de la caña de azúcar. El fitotrón está diseñado de tal manera que las condiciones ambientales que inducen a una variedad particular a florecer, pueden ser seleccionadas y reproducidas después siempre que sea necesario.

Un resultado adicional del trabajo será la posibilidad de obtener dos o tres generaciones donde solo una puede ser obtenida bajo condiciones de campo abierto, y de aquí la aceleración de ciertos proyectos en la propagación de las plantas.

El establecimiento del fitotrón para el estudio de una sóla cosecha es único. Los resultados de los proyectos de investigación descritos y muchos otros en la agenda, se espera que tengan una considerable influencia en el futuro de la industria azucarera de Australia.

Modificaciones en Usina Sta. Lydia

Como Aumentar la Capacidad de los Molinos

Por Luís Antonio R. Pinto, EE. & ME.

Conceptos Generales

La adopción del moderno proceso de molienda, con el uso de altas velocidades periféricas y alimentación forzada, puede aumentar considerablemente la capacidad de un molino existente, sin pérdida en la extracción, siempre que se tomen las necesarias precauciones.

Analicemos primero las distintas variaciones que ésto entraña (con excepción de las calibraciones de las raspadoras y de los molinos, que se consideran adecuadas para cada caso a través de todo este informe.)

Molienda sin Deslizamiento

Tomemos por ejemplo un molino de largo uniforme, con rodillos de diámetro "D" (fig. 1), y supongamos que se viene alimentando con un colchón de bagazo de altura de "h" y una densidad de "d".

Siempre que no haya deslizamiento entre el bagazo y los rodillos ó mazas, el peso del bagazo molido en un minuto será proporcional a la velocidad periférica de los rodillos (v), a la altura (h) y a la densidad (d) del colchón de bagazo, o:

$C_{(capacidad)} = K_o \times V \times h \times d^{(I)}$,

K_o siendo constante.

tomando $K_o \times V = K \times n \times D$:

$(K = \text{constante} = K_o \pi)$

$C = K \times n \times D \times h \times d$ (II).

Esto representa la capacidad teórica para la molienda sin deslizamiento. Para mejorar la capacidad de un molino dado, se puede aumentar a n, h y d.

Influencia del Deslizamiento

En la práctica, el valor de C en la fórmula que antecede no se alcanza nunca, puesto que el deslizamiento no puede nunca eliminarse por completo. Este deslizamiento es definitivamente desfavorable, porque no solo reduce capacidad sino también aumenta enormemente el desgaste de los rodillos ó mazas. Por lo tanto debe ser reducido a un mínimo.

La Relacion Entre Distintas Variaciones Y El Deslizamiento

Para un molino dado el deslizamiento
- *aumenta* por el aumento de *n*
- *aumenta* por el aumento de la altura *h*
- *disminuye* ligeramente por el aumento de *d*
- *disminuye* con la ampliación de la zona de drenaje
- *disminuye* notablemente con el aumento de lo que puede llamarse el "coeficiente de arrastre" de los rodillos, afectado por el rayado, material del rodillo ó maza, etc.

Extraccion

Somos de opinión que la extracción no es afectada por aumentos razonables en *h*, *n* y *d*, siempre que se provea drenaje adecuado para el jugo extraído. Por otra parte, la extracción es *aumentada* mediante una mejor preparación de la caña, uno de los medios utilizados para aumentar *d*, según se muestra más adelante.

Modificaciones Que Se Proponen

De acuerdo con las explicaciones que anteceden las siguientes modificaciones pueden considerarse ahora en lógica secuencia:

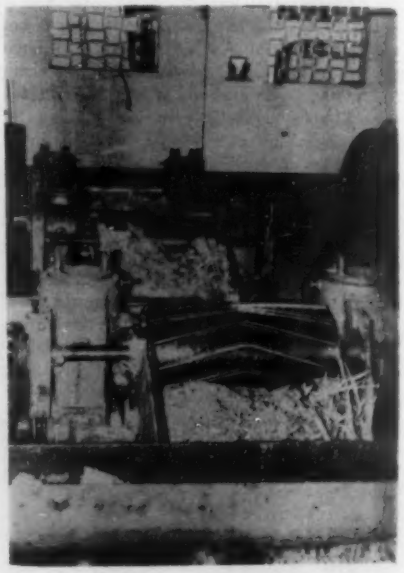
Aumento en el "coeficiente de arrastre" del rodillo ó maza

El espaciado de la acanaladura del rodillo no debe ser menor de ¾"; su ángulo comprendido debe variar entre los 50° y los 55°. El material del rodillo debe ser duro y de grano grueso.

El uso del rayado longitudinal en forma de V en los rodillos superior y de alimentación, es muy aconsejable. Otra buena medida es la adopción, en el caso del rodillo de alimentación, de un espaciado al doble del usado en los rodillos superior y de descarga. No solo aumenta el coeficiente de arrastre, sino también permite un mejor drenaje del jugo, como se muestra más adelante.

Uso de rodillos de alimentación

El uso de rodillos alimentadores, junto con los transportadores intermedios de listones de metal, asegura una alimentación perfecta y uniforme. El rodillo de alimentación es un cilindro construido de acero en lámina, lleno de agua o arena y reforzado con costillas en forma de V (fig. 2). Comprime el colchón de bagazo (disminuyendo *h* y aumentando *d*) y lo empuja hacia la abertura de alimentación del molino.



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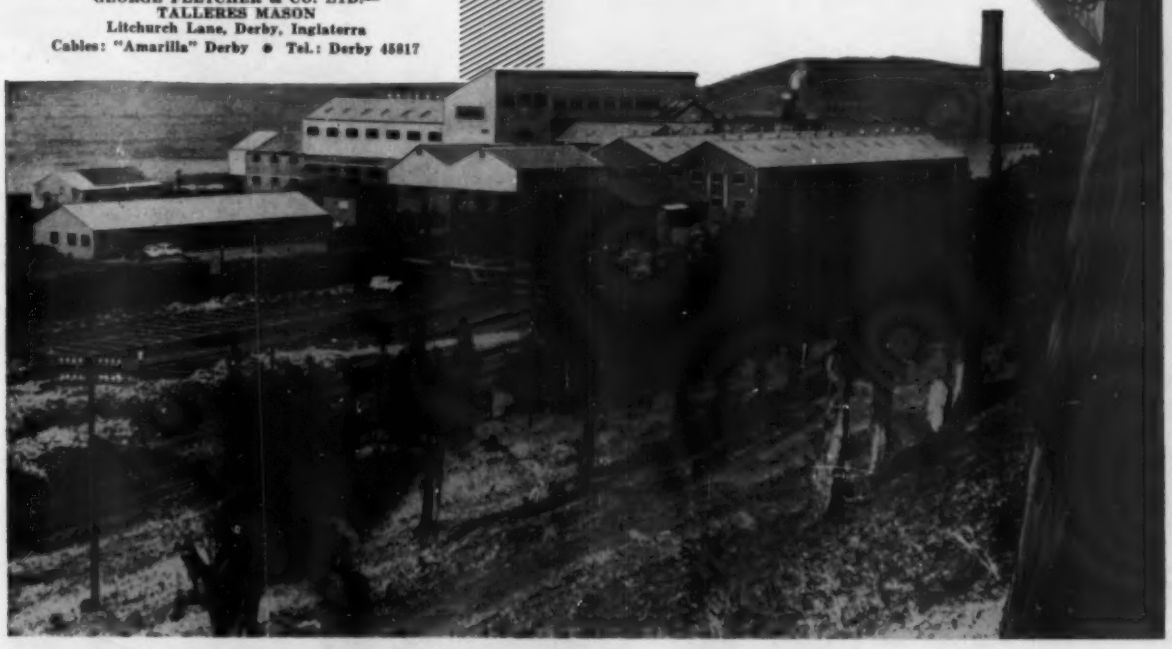


Fig. 1

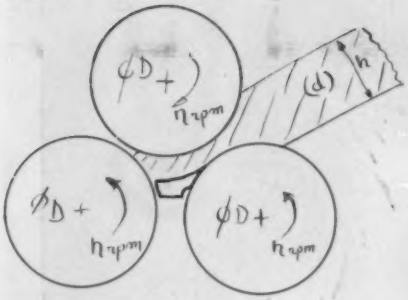
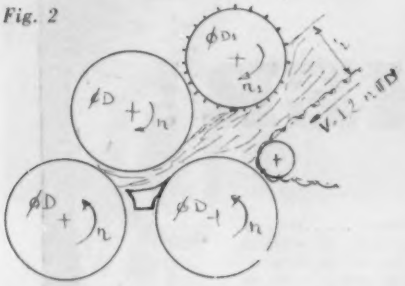


Fig. 2



El diámetro exterior del rodillo alimentador varía generalmente entre 0.7 a 1.0 de D (siendo D el diámetro del rodillo del molino). La velocidad periférica de los rodillos alimentadores debe ser igual a la velocidad lineal del transportador intermedio, o aproximadamente un 20% más alta que la velocidad periférica de los rodillos del molino.

Así tendremos lo siguiente:

$n_1 = 1,2\ D_1\ n$, siendo: n_1 = rotación del rodillo alimentador

$n_1 = 1,2\ D_1\ n$, siendo: D_1 = diámetro del rodillo alimentador

$n_1 = 1,2\ D_1\ n$, siendo: n = rotación del rodillo del molino

$n_1 = 1,2\ D_1\ n$, siendo: D = diámetro del rodillo del molino

Todo molino debe tener un rodillo de alimentación sostenido por un eje flotante, accionado por el rodillo superior.

Aumento del drenaje de jugo

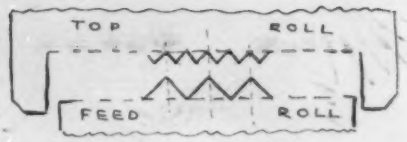
Todo molino debe ser provisto de un rodillo alimentador con rayado Messchaert y/o con espaciado doble (fig. 3). No se aconseja el rayado Messchaert para el rodillo de descarga.

El uso de pequeñas ranuras paralelas en el extremo (zapata) de la raspadora, de unas 2" de largo, 1" de profundidad y ¼" de ancho, ayuda efectivamente la extracción del jugo.

Mejor preparación de la caña

El uso de dos juegos de cuchillas, de

Fig. 3



espaciado reducido, que penetren profundamente en la camada de caña, casi al fondo, produce una camada muy pareja, aumentando al mismo tiempo su densidad (d).

Este tipo de preparación (dos juegos de cuchillas poco espaciadas) para el trabajo de trituración es muy recomendable. Sus resultados no pueden compararse con los obtenidos con el tipo de triturador de martillo, ó desfibradora; pero son muy buenos, y representan una reducción considerable de costos.

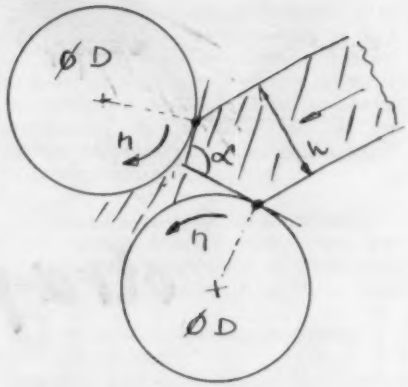
No obstante, si se desea el máximo de capacidad y extracción, el uso de un juego de cuchillas y una desfibradora es lo indicado. Es importante notar aquí que la fuerza empleada en la preparación de la caña se recupera en el proceso de la molienda, que es responsable ahora solo de la extracción del jugo.

Aumento de rotación (n)

Ahora se puede aumentar *n* sin peligro. Sin embargo, puesto que el deslizamiento aumenta constantemente con la velocidad periférica, es necesario precisar un límite adecuado. Los grandes molinos de diseño reciente pueden alcanzar velocidades de hasta 18 o 20 m/min. Pero el deslizamiento depende también del ángulo de alimentación, L (fig. 4) y este ángulo, en primera aproximación, tiene relación con $\frac{n}{D}$. Es por esto que esos grandes y rápidos molinos tienen que trabajar, en general, con un valor menor de L, para compensar la alta velocidad.

Por esta razón y considerando también que la gran mayoría de los ejes de molino se encajan en cojinetes de resbalamiento (de bronce), preferiríamos fijar un límite a *n* en lugar de limitar la velocidad periférica. En nuestra opinión, n = 6 rpm es un límite seguro en la mayoría de los casos.

Fig. 4



La Alimentacion De La Desmenuzadora (Dos O Tres Rodillos)

Hechas las modificaciones que anteceden, sucede a menudo que la alimentación de la desmenuzadora se convierte en el factor limitador. Para eliminar esta dificultad, el sistema clásico de alimentación de la desmenuzadora fue abandonado (utilizándose una larga canal inclinada en ángulo agudo) y se adoptó el sistema representado en la Fig. 5.

En este sistema, el transportador de caña, de velocidad variable, alimenta a un transportador intermedio de velocidad constante, impulsado por la desmenuzadora. Dicho transportador, con la ayuda de un rodillo de alimentación, abastece a la desmenuzadora. El sistema asegura una alimentación perfecta y pareja, con una reducción incidental de los costos de instalación, eliminándose la necesidad de un transportador de caña alto y largo.

Limitaciones

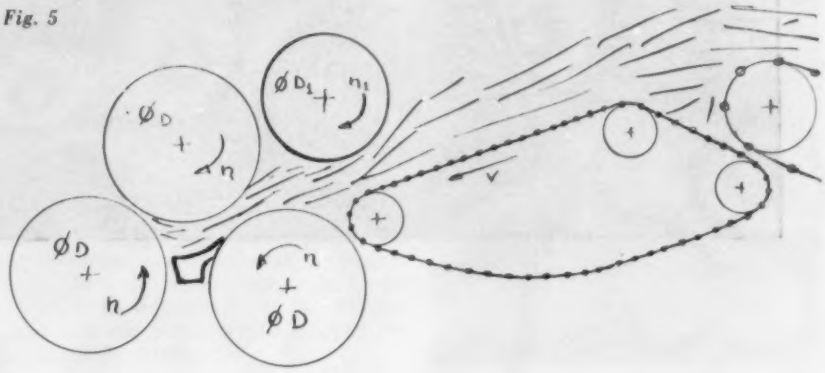
Fuerza Motriz

Cada aumento en la capacidad de molienda de caña requiere un aumento correspondiente en la producción de fuerza del motor(es) del molino (con la excepción del que se gana con la preparación de la caña, según se ve más arriba.)

Si se hace necesaria una substitución del motor(es), la práctica moderna enseña que

(*Signe en la página* 84)

Fig. 5



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Eliminación de la Descolorización en el Africa Oriental Portuguesa

Por J. Dos Santos Ilha
Usine Bom Jesus, Luanda, Angola, Africa Oriental Portuguesa

Muchos centrales azucareros que practican el proceso de sulfitación, generalmente convierten del 30 al 50% de su producción total en azúcar blanca. Con el transcurso del tiempo, esta azúcar tiende a ponerse amarillenta. En el ingenio Bom Jesus se han hecho estudios para descubrir las causas de esta amarillez, habiéndose llegado a las siguientes conclusiones:

El más importante de los factores responsables de esta descolorización son las sales férricas de hierro que existen en el jugo de caña. Cuando el jugo es tratado con cal, estas sales férricas no se precipitan, como se pudiera esperar, sino que se mantienen en suspensión, o son involucrados por ciertos acidos orgánicos contenidos en el jugo; y, cuando, después de la alcalización y haberse sulfurado el jugo, los couglomerados se deshacen, el hierro férrico que contienen se reduce a la condición ferrosa y permanece en el jugo como una impureza incolora. Durante la subsiguiente operación de fábrica, parte de este hierro ferroso es absorbido por los cristales de azúcar; cuando el azúcar se seca al contacto con el aire, el hierro ferroso se reoxida, volviendo a la condición férrica y el azúcar se descolora. Es de notarse el hecho de que ésto no ocurre en los ingenios que tratan sus jugos por intercambio iónico. También es un hecho que, cuando la primera masa cocida es sometida a un tratamiento con hidrosulfito de sodio o "Blankit," esta sustancia no reacciona sobre todas las materias orgánicas que hay en el jugo, habiendo así, como consecuencia, posteriores ocasiones para la descolorización por reoxidación.

Teniendo en cuenta estas consideraciones, era evidente que sería necesario eliminar el hierro férrico en la forma de hidrato ferroso $Fe\ (OH)_2$. Esto se lleva a cabo ahora, tratando el jugo con superfosfato de calcio industrial que tiene la composición $PO_4\ HCa$, $SO_4\ Ca$, y entonces alcalinizando el jugo a pH 8.0 con leche de cal. En esta operación ocurren las siguientes reacciones simultáneamente:

(1) $XFe\ (Ch) + SO_4\ Ca = XCa(ch) + SO_4\ Fe$

(2) $PO_4\ HCa + SO_4\ Fe = PO_4\ HFe + SO_4\ Ca$

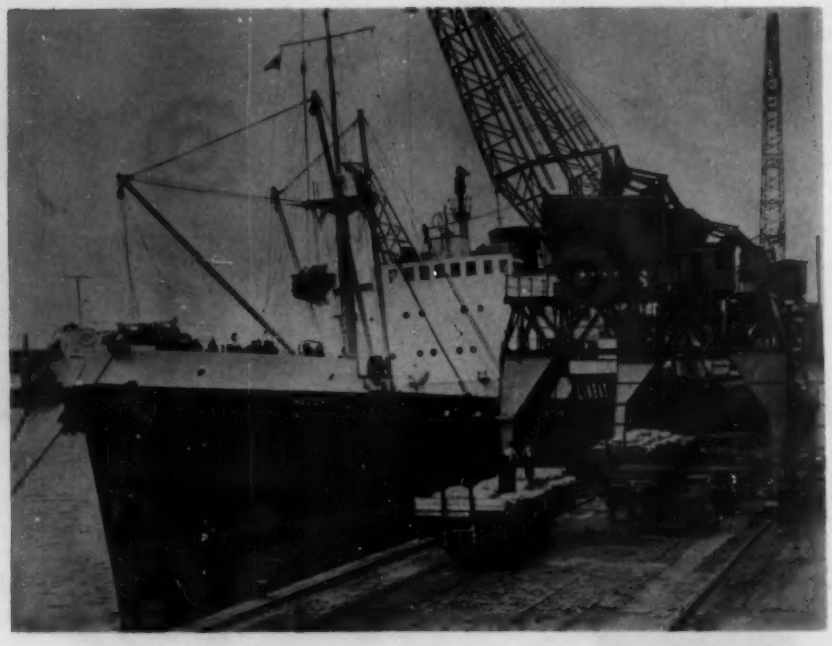
(3) $2PO_4\ HFe + 5Ca(OH)_2 = (PO_4)\ 2Ca_3 + 2Fe\ (OH_2) + 2\ H_2O.$

En la tercera reacción, el hierro ferroso es precipitado como $PO_4\ HFe$, y el jugo es entonces sulfurado a pH 6.4 ó 6.8.

El fosfato tricálcico que se forma en esta reacción es un poderoso electrólito que facilita la sedimentación arrastrando la sustancia albuminosa y dejando el jugo claro y brillante. Una gran mejora en el trabajo del filtro Oliver y un descenso en la pol del lodo del filtro prensa también han sido observados. Se economiza tiempo debido a una más rápida filtración. Otra consecuencia es una disminución en la incrustación en el doble efecto.

Ahora se está usando hidrosulfito F2 en lugar de Blankit para el tratamiento de masas cocidas de la primera templa; ésto elimina por reducción las materias colorantes, tanto orgánicas como inorgánicas. Durante la zafra de 1959-1960 en el Bom Jesus, ha sido posible obtener azúcar blanca comparable a la producida por el proceso de carbonatación.

■



Llega a la Unión Soviética un cargamento de azúcar crudo cubano. Ostentando la bandera cubana, el SS. Río Jibacoa hace entrega de un cargamento de sacos de azúcar crudo en el puerto ruso del Báltico, Klaipeda, de acuerdo con el convenio de cinco años para suministrar azúcar a cambio de maquinaria y crédito. Sovfoto.

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BÜTTNER-WERKE KREFELD-UERDINGEN

Disputa Sobre Azúcar en Fiji Amenaza la Economía de la Colonia

El corte de caña en las Fiji debió haber comenzado el 20 de Junio, pero a causa de desacuerdos entre los cosecheros y los dueños de ingenios no empezó hasta principios de agosto y aun entonces solamente en una región aislada, que puede proporcionar a lo más un 15% de la cuota asignada a esta colonia británica.

El azúcar produce el 63% (alrededor de 8 millones de libras esterlinas) de los ingresos por exportación de la colonia. Si no se produce azúcar en cantidades razonables, la colonia se enfrenta a la ruina económica y en consecuencia a una cruenta lucha civil.

La compañía australiana, the Colonial Sugar Refining Co. Ltd., es la única que elabora azúcar en la colonia. La misma posee tres centrales en la zona árida (en los alrededores del Aeropuerto Internacional de Nadi) en Viti Levu, la isla principal, y otro en la segunda isla en tamaño, la Vanua Levu. El ingenio Labasa (Vanua Levu) comenzará la molienda el 11 de Agosto.

La Colonial Sugar Refining Company no siembra caña. Aunque es dueña de una considerable extensión de tierra, ésta es arrendada en parcelas de 10 y 20 acres a los cosecheros. El resto de ellos está radicado en tierras de la Corona, en tierras nativas y en tierras de propiedad privada, en su mayor parte dadas en arrendamiento o poseídas en pequeños lotes.

El convenio de compras existente entre los cosecheros y los dueños de ingenios, expiró en 1959. Este año comenzó con las existencias de azúcar en el nivel máximo permisible. Nuevas variedades de caña, mejores técnicas de cultivo y tiempo favorable dieron por resultado una cosecha que se calculaba produciría algo así como un 20% de azúcar por encima de la cuota.

En las negociaciones se llegó a un acuerdo sobre los precios y al conocimiento de que la Colonial Sugar Refining Company no podía tomar la cosecha entera sin comprometerse a moler más allá de la cuota. Sin embargo, persistía la disputa entre los cosecheros y los dueños de ingenios en cuanto a como debía seleccionarse la caña para producir la cuota de azúcar. El 24 de julio se firmó un acuerdo con la compañía por los representantes de la Fiji Kisan Sangh, Labasa Kisan Sangh y tres asociaciones de cosecheros fijianos. Como consecuencia de ello, el corte y la molienda dieron comienzo en el Labasa (Vanua Levu) el 11 de agosto, aún cuando los representantes de dos asociaciones indias rehusaron firmar.

El punto esencial del contrato fue que los ingenios comprarían suficiente caña para producir la cuota de 199,000 toneladas de azúcar o cualquier cantidad que pudiera molerse hasta el 23 de enero de 1961. El grupo en desacuerdo exigió que la CSR se comprometiera a comprar un porcentaje definido (76%) de la caña y a no fijar fecha para el cierre de la molienda. Los representantes de la compañía se mantuvieron firmes en cuanto a que, aun cuando ellos esperaban comprar alrededor del 80% de la cosecha, no podían fijar un porcentaje definido y que era antieconómico continuar moliendo después del 23 de enero. El acuerdo firmado el día 24 fué el resultado de concesiones hechas por ambas partes. El mísmo fué firmado por representantes de la Fiji Kisan Sangh, Labasa Kisan Sangh, el Nadroga, Ra y Ba Fijian Cane Growers Associations. Se calcula que estos grupos representan el 65% de los cosecheros. Pero aunque los grupos disidentes, Fiji Maha Sangh y Vishal Krisak Sangh, representan solamente alrededor del 35% de todos los cosecheros de la colonia, ellos representan, sin embargo, cerca de la mitad de todos los cosecheros indios en Viti Levu, quienes son de importancia primordial.

La colonia crée firmemente que el propósito de los que rehusaron el convenio de julio, no es principalmente el de obtener mejores condiciones de compra para los cosecheros este año, sino el de hacer salir de Fiji a la Colonial Sugar Refining Co. y reemplazarla con ingenios de dueños locales. Para que este objetivo fuese alcanzado, la colonia tendría que pagar el precio en miseria económica y cáos social.

■

Silo de Azúcar Estalla en Suecia

Según se informa, dos gigantescos silos de azúcar estallaron en Hopingebro en el Sur de Suecia, matando a dos trabajadores e hiriendo a otros siete. La explosión arrasó con la más grande fábrica de azúcar de Escandinavia. Bloques de concreto de más de cien libras fueron lanzados a más de una milla y los cristales de las ventanas de edificios que se encontraban a tres millas de distancia quedaron destrozados.

Uno de los trabajadores murió al ser aplastado por un pedazo de concreto, el otro bajo un diluvio de azúcar hirviendo. Testigos presenciales dijeron que algunos trabajadores volaron por el aire como hojas al viento, al cual siguieron llamaradas de fuego que salian de la explosión.

Se cree que la misma fue provocada por una chispa en el polvo de azúcar comprimido que se hallaba en un elevador, la cual dió inicio a una serie de explosiones.

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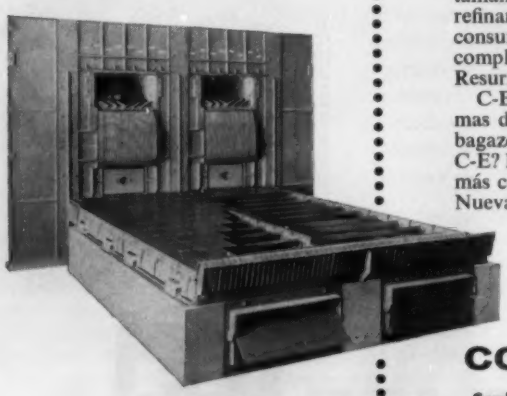

Los sistemas modernos C-E de quema de bagazo—cuyas capacidades varían entre 15,000 lb/hora y 250,000 lb/hora—ofrecen ventajas económicas que a menudo bastan para reembolsar el costo del equipo en unos años.

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Los que usan las calderas C-E confirman su eficiencia y se han recibido informes favorables de ingenios azucareros en la América Latina, Hawaii, las Filipinas, India y Sudáfrica. Reproducimos a continuación unos comentarios típicos: ". . . una economía de $3,000 durante una cosecha de seis meses en costos de mano de obra en la sala de calderas, al comparar sus resultados con los de un horno del tipo herradura de tamaño similar." "Economizamos más de 50,000 galones de petroleo al refinar un 25% más de azúcar." "Reducimos en un 75% el tiempo consumido en limpieza del horno." ". . . una temporada de molienda completa sin interrumpción salvo para el festival de Pascuas de Resurrección."

C-E conoce la industria de azúcar y sabe como resolver los problemas de *usted* en relación con la generación de vapor y la quema de bagazo. ¿Por qué no modernizar sus instalaciones *ahora*—con equipo C-E? Lo único que tiene que hacer es llamar al representante de la C-E más cercano o escribir al Departamento de Exportación de la C-E en Nueva York.

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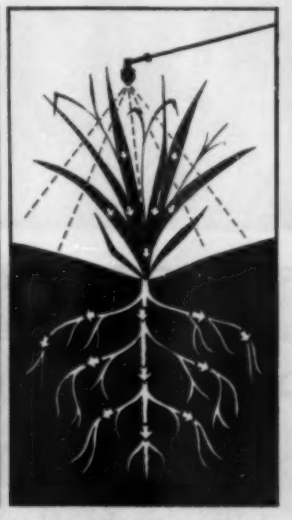
Un hacendado estaba preocupado por el alto costo del control manual de las malezas, las cuales robaban a sus cañas el alimento y la humedad del suelo, pero el control de ellas le despojaba de sus ganancias.

Su abastecedor de productos agrícolas Dow le dijo que podía reducir sus costos controlando las malezas con Matamalezas Químicos Dow.

"Extirpe las gramíneas con Dowpon*," le dijo, "y para malezas de hojas anchas use el Matamalezas 2-4 Dow, Fórmula 40*. Ambos pueden combinarse en un rociador de mochila o de tractor, para obtener una aplicación rápida y económica."



"La azada o el machete dejan las raíces fuertes y lozanas y las malezas retoñan en poco tiempo, pero los Matamalezas Químicos penetran por las hojas llegando hasta las raíces más profundas, matando toda la planta. Una sola aplicación es suficiente."

El hacendado siguió este consejo. Sus cañaverales están ahora limpios de malezas, sus cañas rinden más y sus costos de control de malezas son menores. Usted también puede reducir sus costos, comuníquese con su distribuidor Dow local o la sucursal más cercana.

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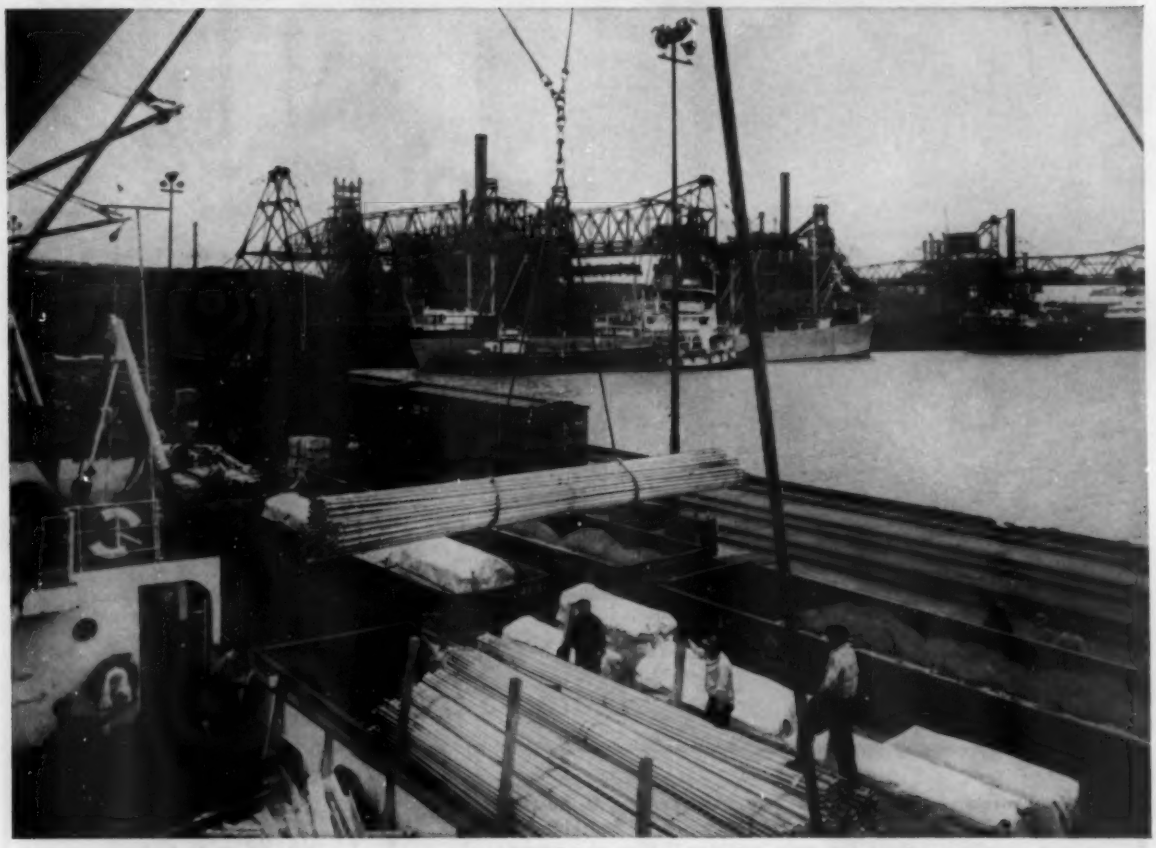
Permítanos comunicar su nombre a nuestro distribuidor en esa plaza. El puede suministrarle la información necesaria acerca de los productos agrícolas Diamond — como si fuesen socios comanditarios, que trabajan provechosamente para Ud. Al mismo tiempo podremos enviarle el Boletín PS-001, absolutamente gratis. Este boletín, que trata del mejor modo de utilizar los herbicidas, contiene también cuadros de recomendaciones y muchos otros datos de suma importancia y utilidad para Ud.

Diamond Alkali Inter-American Corporation

ROOM 1614 — 99 PARK AVENUE, NUEVA YORK 16, N. Y., E. U. DE A.

Dirección cablegráfica: DIAMALKALI

de las acerías de la Bethlehem



a los puertos de todo el mundo

El acero de la Bethlehem se encuentra universalmente en uso en toda clase de industrias. A su vez, las materias primas empleadas en la producción del acero Bethlehem tienen origen en unos 60 países diseminados por todo el mundo. Este esfuerzo espontáneo de la Bethlehem, de comprar y vender en muchos países, es precisamente el factor que fomenta el continuo intercambio de mercancías, tan necesario a la creación de una sólida economía mundial. Procediendo de esta manera, la Bethlehem contribuye con la parte que le corresponde al sólido desarrollo del comercio internacional. Bethlehem Steel Export Corporation, 25 Broadway, New York 4, U. S. A. Cables: BETHLEHEM NEWYORK.

BETHLEHEM STEEL

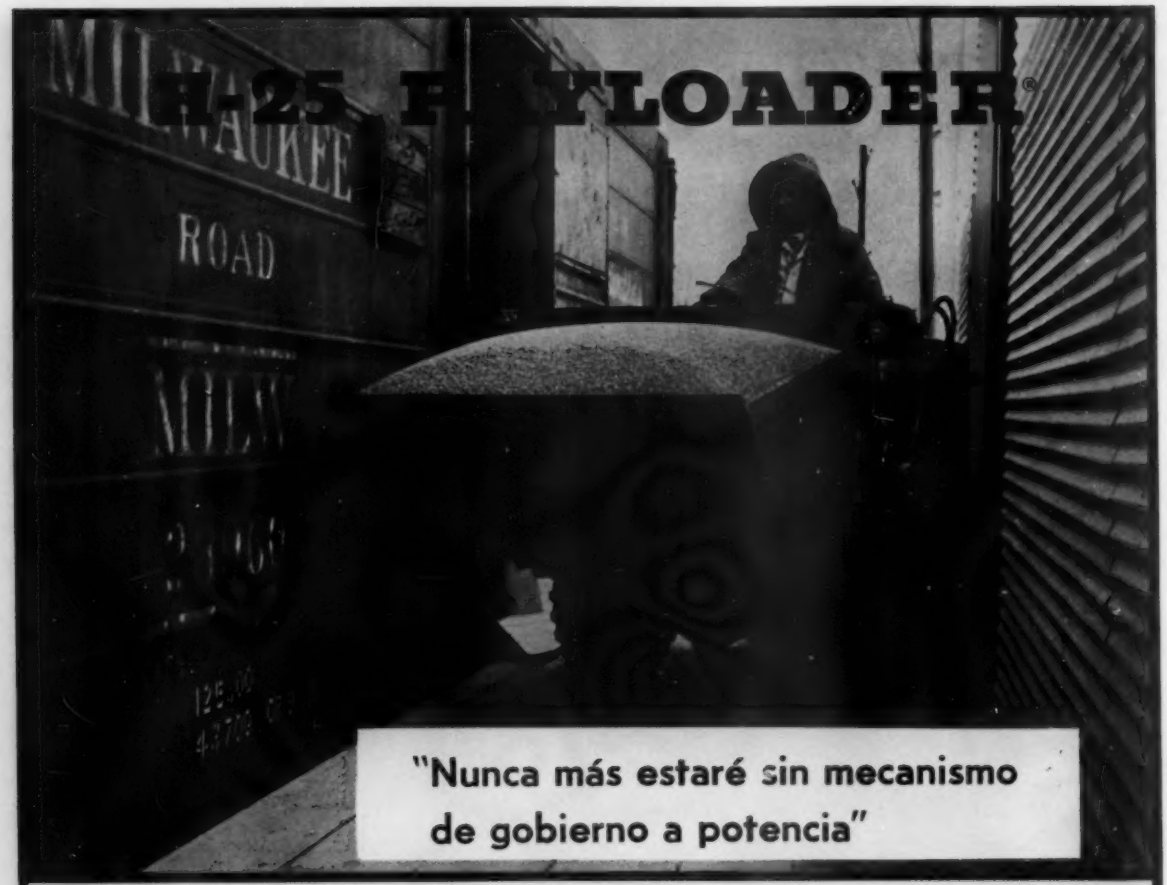
La gran planta Sparrows Point de Bethlehem en el Puerto de Baltimore es la acería más grande en los EE.UU., donde los productos a exportarse pasan directamente de la fábrica a los vapores atracados a sus propios muelles.

Representada en todas las principales ciudades del mundo por las oficinas y representantes de la Bethlehem Steel Export Company

Para detalles completos sobre los productos de la Bethlehem Steel, consulte a

Bethlehem Steel of Cuba, S. A., Edificio Ambar Motors 606, Avenida Menocal y 23, Habana, Cuba

9025



"Con dirección mecánica, no hay esfuerzo, y sí mucha más facilidad para maniobrar. Es más sencilla, y también permite cargar y salir y entrar con más rapidez," dice el operador de "PAYLOADER" Roy Forman.

Tanto si está trabajando en la descarga de vagones de ferrocarril o en cualquier otro tipo de manipulación a granel, la dirección mecánica y transmisión de cambios mecánicos característicos del "PAYLOADER" Modelo H-25 significan facilidad en el manejo y mayor rapidez en las maniobras, lo que mueve más tonelaje por turno.

Este notable tractor de pala también cuenta con la más completa protección contra el polvo y la suciedad — un sistema triple depurador de aire, filtros para aceite tipo cartucho en los tres sistemas de lubricación, y cierres para grasa y aceite en todas las junturas estratégicas.

También hay disponibles otros modelos "PAYLOADER" de probada calidad, con capacidad de trabajo de 2,000 a 12,000 libras, que pueden obtenerse por mediación de los Distribuidores de Equipos de Construcción de la International Harvester Export Co. Póngase en contacto hoy mismo con el distruidor más cercano o escriba solicitando informes adicionales.

Facilidad de Maniobra y Velocidad . . .

El H-25, con capacidad de porte de 2,500 lbs., radio de viraje de sólo seis pies y fácil dirección mecánica, es el tractorpala más productivo jamás diseñado. Otras destacadas características del H-25 que aceleran la producción y reducen el esfuerzo del operador son la transmisión de cambios mecánicos con dos velocidades, de marcha hacia adelante y marcha atrás, diferencial de transferencia de potencia y una fuerza de levante en el cubo de 4,500 lbs.

LA FRANK G. HOUGH CO.
881 Sunnyside Ave., Libertyville, Ill.

☐ Sírvase enviarme datos completos sobre el PAYLOADER H-25
☐ Otros Modelos PAYLOADER

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Ciudad _____ País _____

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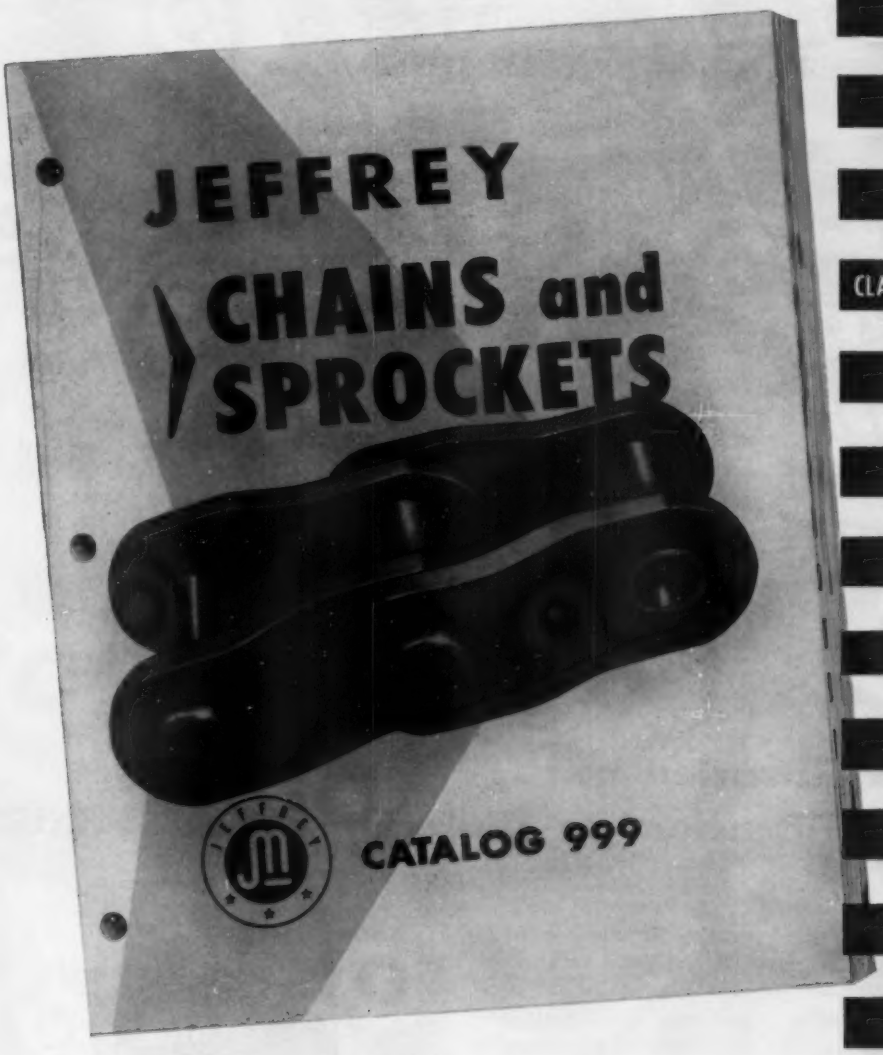
descritas e ilustradas (señaladas en el índice según se indica) en este nuevo catálogo para que puedan ser especificadas con más facilidad



- CHAIN DATA
- DETACHABLE LINK
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- TYPE H MILL
- CLASS 700 PINTLE
- CLASS 800 STEEL BUSHED
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- DRAG OR REFUSE
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- STEEL KNUCKLE
- STEEL THIMBLE ROLLER DRIVE AND CONVEYOR TYPES
- STEEL BLOCK
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- SPROCKET WHEELS

LOS HOMBRES QUE SELECCIONAN CADENAS para transmisión de fuerza y para transporte encontrarán muy útil este nuevo catálogo Jeffrey. Dicho catálogo recomienda tipos adecuados de cadenas y ruedas dentadas para distintos usos, simplificando así la selección de los mejores y más economicos para cada operación. Jeffrey tiene la experiencia necesaria en diseño e ingeniería para ayudarle en cualquier trabajo específico—conducción, elevación o transmisión de fuerza. Para cubrir sus necesidades en cuanto a cadenas, llame a la oficina de ventas o distribuidor Jeffrey más cercano.

Para obtener copia del Catálogo 999, escriba a la Export Division, The Jeffrey Manufacturing Company, Columbus 16, Ohio, E.U.A.

JEFFREY

CONDUCCION • ELABORACION • EQUIPO DE MINERIA • MAQUINARIA DE TRANSMISION • FABRICACION POR CONTRATO

El arte de la filtración con . . .
Auxiliares de Filtración de Diatomita EAGLE-PICHER

Los Auxiliares de Filtración de Diatomita Eagle-Picher, sin sabor ni olor, están disponibles en calidades standard para practicamente todos los trabajos de filtración, desde el agua hasta los brebajes y los antibióticos. Las calidades específicas pueden ser recomendadas a base del tipo y tamaño del material en suspensión, la viscosidad del líquido a filtrarse, la clase de equipo de filtración que se utiliza y la duración de los ciclos de filtración. Existen auxiliares de filtración Eagle-Picher hechos especialmente para llenar sus requerimientos en cuanto a velocidad de flujo y objetivo específico de filtración. Nuestros ingenieros técnicos pueden ayudarle a encontrar la solución adecuada a su problema de filtración. Celebramos la oportunidad de servirles y compartir con ustedes nuestra amplia y diversa experiencia.

Desde 1843

EAGLE EP PICHER

EAGLE-PICHER

La Eagle-Picher Company, Celatom Products, Dept. S-1060, Cincinnati 1, Ohio

Aumente la producción, reduzca los costos de transporte —con las locomotoras industriales G-E

Las robustas y versátiles locomotoras diesel-eléctricas General Electric con frecuencia reembolsan anualmente de 20 a 30 por 100 de su costo inicial, con los ahorros efectuados en su operación. Por eso, en todo el mundo, muchas empresas industriales están poniendo las locomotoras G-E a su servicio, para reducir sus costos de operación.

Considérense estas grandes ventajas económicas...

- Requieren un solo operador
- Reabastecimiento de combustible cada tres días solamente
- Sencillez de diseño — economiza en costos de mantenimiento
- Bajo peso axial — reduce los gastos de conservación de la vía

...y los siguientes factores ahorradores de tiempo:

- Pueden reabastecerse en 20 minutos durante cambios de personal
- Requieren sólo una inspección periódica
- Máxima disponibilidad de 90 por 100
- Mayor potencia acelera el cumplimiento de los horarios

Y usted puede confiar en que las siete locomotoras industriales G-E de tamaño standard—desde la de 25 toneladas de 150 HP hasta la de 100 toneladas de 670 HP—pueden utilizarse continuamente las 24 horas del día, los siete días de la semana, necesitándose sólo 8 horas semanales para su mantenimiento normal.

Díganos el uso a que será destinada... para cada aplicación hay una locomotora diesel-eléctrica apropiada. Investigue cómo reducir sus costos de operación comunicándose hoy mismo con el representante más cercano de General Electric. 120-S16

Nuestros productos son índice de progreso

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Oficinas Principales: 150 East 42nd Street, New York 17, New York, U.S.A.

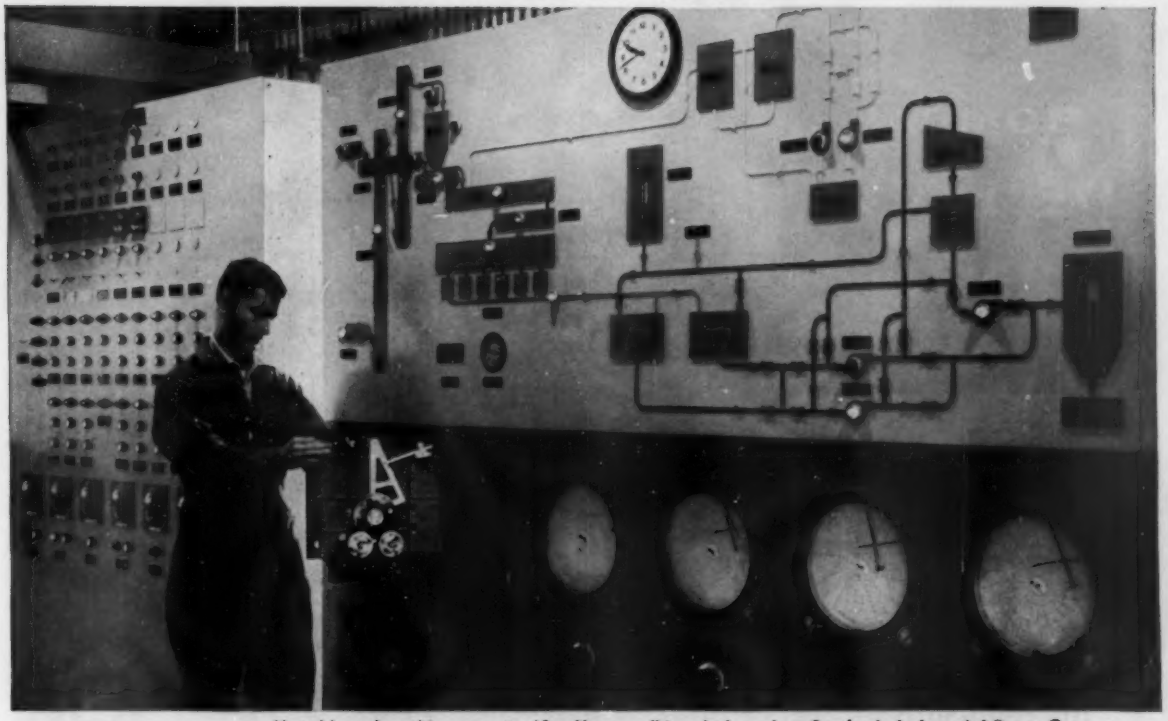
NORIT SUPRA

para azúcar refinado

N-4-31

NORIT

UNITED NORIT SALES CORPORATION LTD - AMSTERDAM - HOLLAND



Un tablero de gobierno semigráfico Honeywell instalado en la refinería de la Imperial Sugar Company sirve para mantener bajo constante vigilancia los procesos de la sala de derritimiento del azúcar y ayuda a mantener una nueva norma de eficiencia en los métodos de refinación de azúcar.

Los controles Honeywell para la sala de derritimiento de azúcar ayudan a la refinería de la Imperial Sugar a aumentar su capacidad a 2,500,000 libras al día . . .

Al completarse la construcción de una nueva sala de derritimiento de azúcar en la refinería de la Imperial Sugar Company en Sugar Land, Texas, queda finiquitado un programa de modernización de 12 años de duración y comienza una era de operaciones mas provechosas por medio de controles automáticos. La instrumentación Honeywell convierte el proceso de la sala de derritimiento en operación automática de principio a fin.

La regulación automática del proceso de mezcla se basa en la medición de la carga que pesa sobre el motor de accionamiento de la mezcladora. El régimen de flujo del melado de afinación, que se mantiene a una temperatura constante, hacia la mezcladora se ajusta para que la carga del motor se mantenga en un valor fijo.

Este sistema de control de la mezcladora produce una magma de viscosidad uniforme que da por resultado una mejor limpieza de las centrífugas. La duración de los ciclos en las centrífugas se ajusta entre puntos mínimos y máximos según el nivel promedio en las cachaceras y los tanques de aprovisionamiento de carbón hueso animal.

Una cantidad pre-determina da de agua dulce es agregada automáticamente al espiral antes de llegar al tacho de derretir con cada cargamento de azúcar lavado a medida que sale de la centrífuga. El Brix, temperatura y nivel todos están regulados y mantenidos en el deseado valor por medio de volutas individuales de regulación. El nivel en las cachaceras que siguen al tacho de derretir se regula automáticamente por el ajuste de la volocidad de bombeo del licor colado al tanque. Un tablero de gobierno semigráfico localizado en un punto céntrico ofrece al operador un cuadro claro y completo de todo el proceso.

Para obtener las ventajas de la instrumentación en cualquier proceso azucarero, póngase en contacto con el ingeniero de campo Honeywell más cercano. Llámele hoy mismo. Sólo tiene que levantar el teléfono.

MINNEAPOLIS-HONEYWELL, Wayne and Windrim Avenues, Philadelphia 44, Pa. En el Canadá, Honeywell Controls Ltd., Toronto 17, Ont.

Honeywell

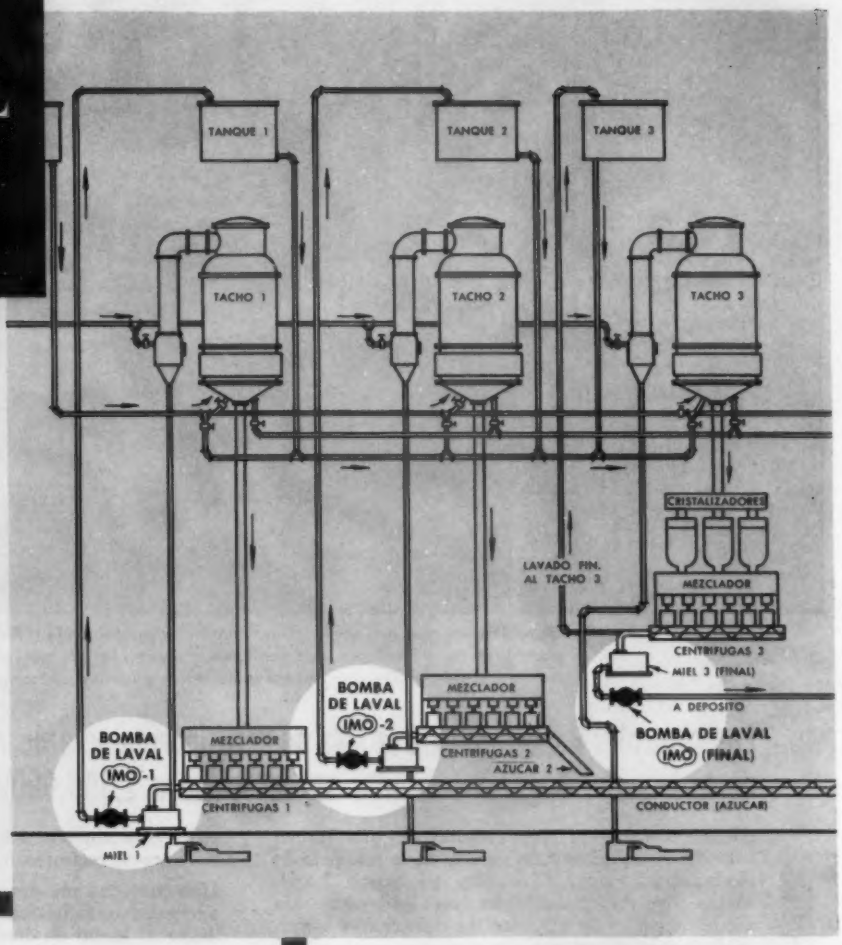
First in Control

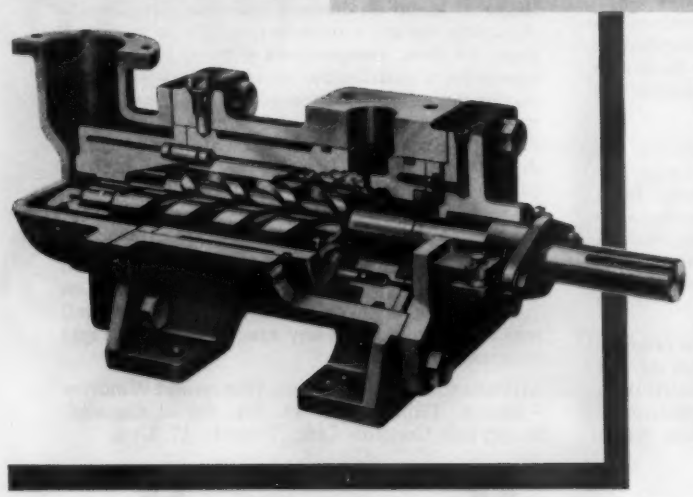
SINCE 1885

75th YEAR PIONEERING THE FUTURE

BOMBAS DE LAVAL IMO

Las bombas confiables De Laval IMO satisfacen los requisitos exigentes de bombear la melaza





El bombear la melaza viscosa requiere una unidad calculada para este servicio. La bomba DE LAVAL IMO con su hélice exclusivo y diseño de polea de guía se ha probado ser sobresaliente para este servicio exigente.

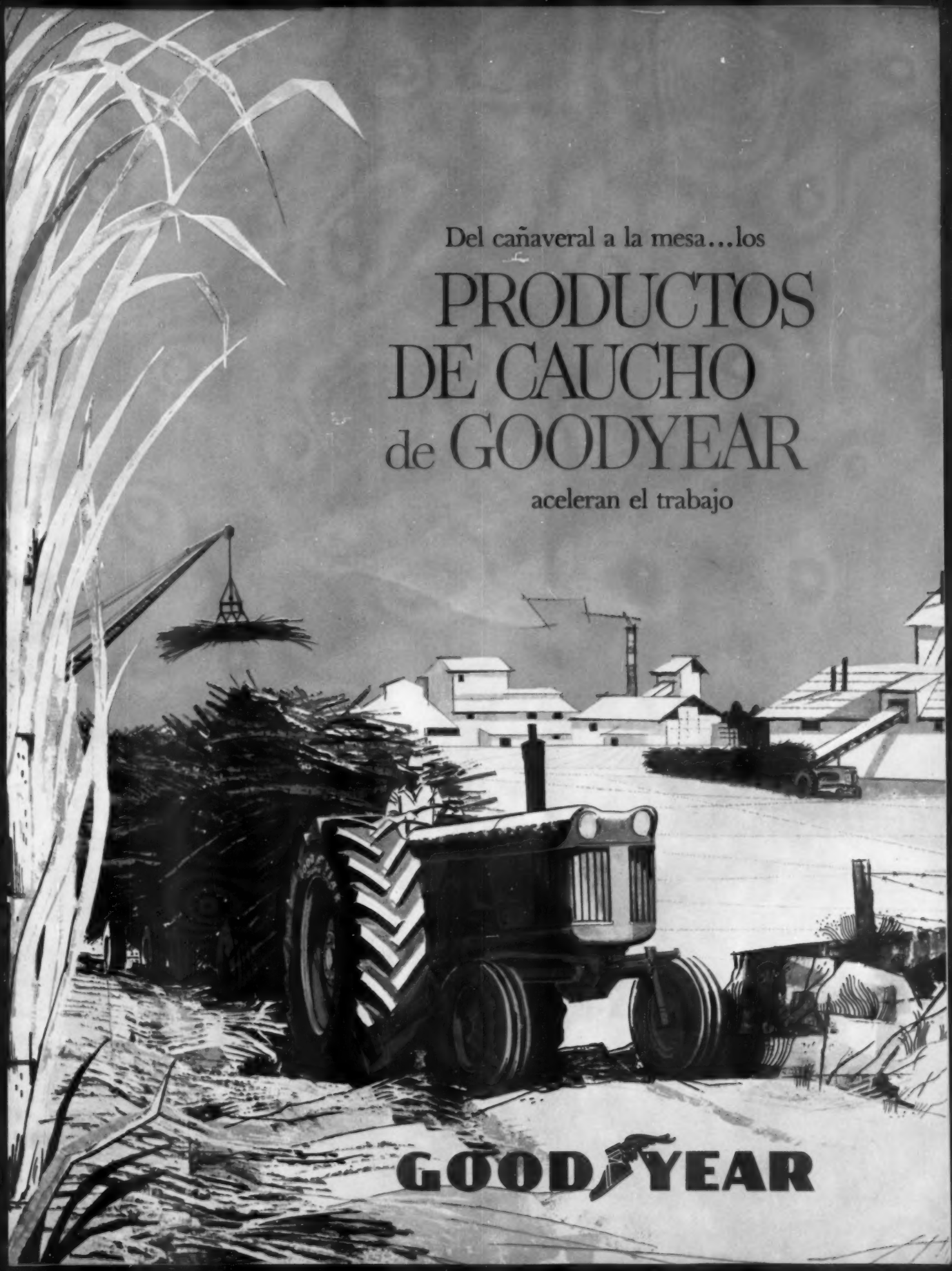
Las bombas IMO libres de dificultades han estado en operación por muchos años en las refinerías principales por todo el mundo.

Si Ud. nos dice sus requisitos—cuántos galones bombea, cuál es la viscosidad, etc., nos agradaría darle más información.

DE LAVAL *Steam Turbine Company*

Nottingham Way, Trenton 2, New Jersey, E.U.A.

DL217


Del cañaveral a la mesa...los
PRODUCTOS
DE CAUCHO
de GOODYEAR
aceleran el trabajo
GOODYEAR

Todo su trabajo se acelera tremendamente cuando el trabajo manual se reemplaza por Correas Transportadoras de Goodyear. Aceleran el descargue de la caña, el transporte de la misma a los molinos —el cargue del azúcar refinada para su exportación.

Porque para las Correas Transportadoras el transporte de la caña de azúcar misma, más que el azúcar ya ensacada, es el camino hacia la mecanización eficiente de algunos de los ingenios, molinos y refinerías más importantes y productivos a través de la industria azucarera.

Muchos muelles de embarque, por ejemplo, utilizan—casi completamente y a velocidades fantásticas—las Correas Transportadoras de Goodyear para el cargue del azúcar.

En uno de tales muelles se carga azúcar a granel a razón de ¡650 tons. por hora! Un vapor de 10.000 tons. se carga ahora en menos de 2 días . . . trabajo éste que, cuando era manual, demoraba tres semanas.

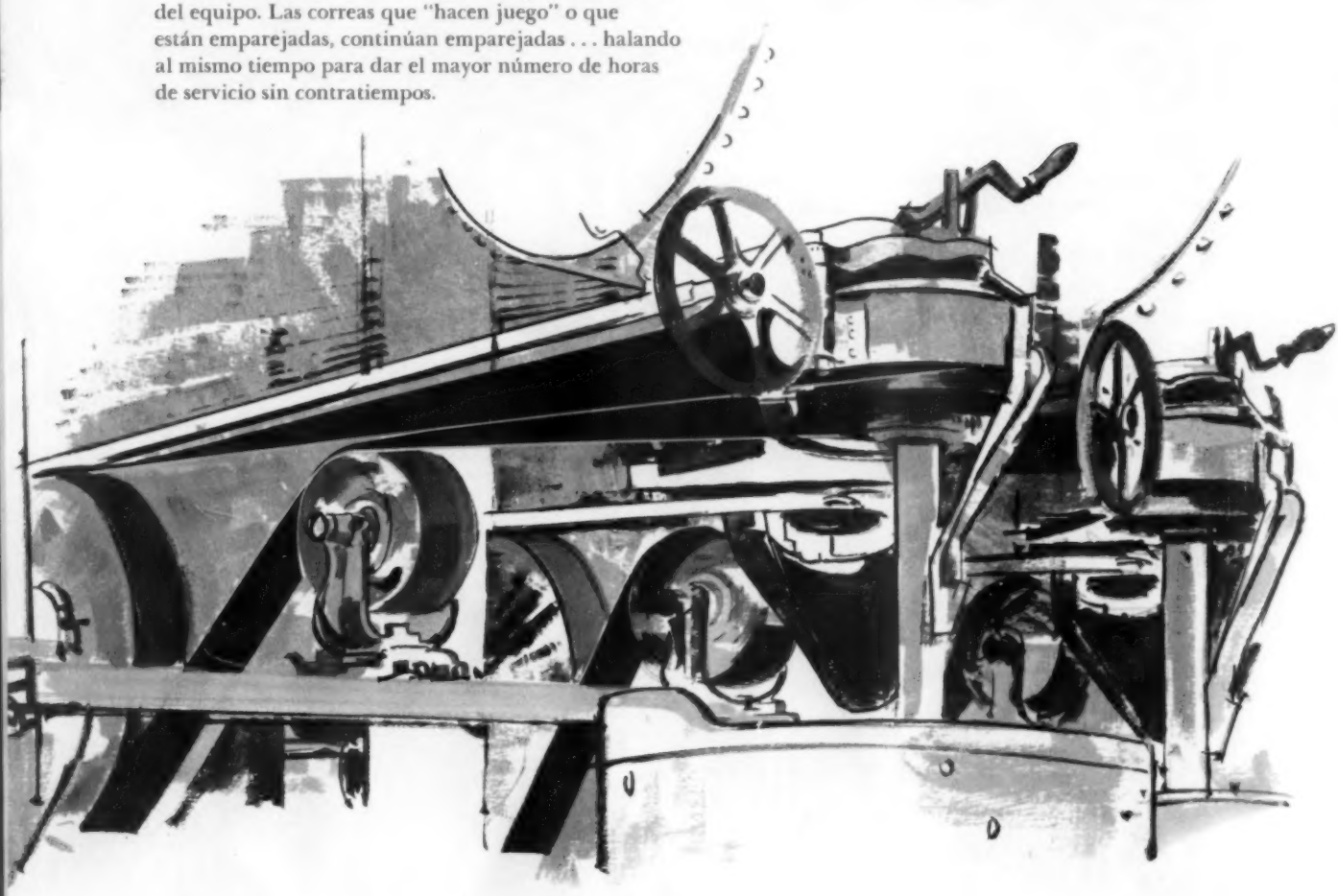
Para enjaezar todos los caballos de fuerza de los tractores modernos—y ponerlos a trabajar para acelerar la tarea—usted necesita llantas como las SPECIAL SURE-GRIP, de "profunda dimensión".

Estas llantas sobresalientes utilizan sus barras más profundas y más rectas para proveer tracción donde otras llantas fallan. Su acción agarradora, a modo de cuña, le permite realizar *más* trabajo en *menos* tiempo—con *menos* gasto de combustible.

¡Y las llantas SPECIAL SURE-GRIP son increíblemente fuertes! Esto se debe a que son construidas con la Cuerda 3T exclusiva de Goodyear, la cual es procesada bajo un control preciso de Tensión, Temperatura y Tiempo. Es esto su mejor protección contra agrietamientos, magulladuras y deslices del aro.

Sume usted todas estas ventajas y le será fácil apreciar el ahorro que—tanto en tiempo como en dinero—unas llantas como éstas pueden brindar en cualquier plantación.

Zafra tras zafra, en las centrífugas de los molinos más importantes, las Correas de Transmisión COMPASS de Goodyear rinden un servicio mejor y duran más que las correas ordinarias.
Las correas que se ven aquí, por ejemplo, duraron de 2 a 3 cosechas sin la menor falla . . . reduciendo los costos a casi una tercera parte.
Las Correas en "V" de Goodyear rinden igualmente un servicio excelente en las cortadoras y otras unidades del equipo. Las correas que "hacen juego" o que están emparejadas, continúan emparejadas . . . halando al mismo tiempo para dar el mayor número de horas de servicio sin contratiempos.



¡Recuerde! cada uno de los productos industriales de caucho descritos en estas páginas son construidos con la maestría propia de Goodyear, sinónimo de CALIDAD. No solamente son mejores sino que duran más, con menos reparaciones y al más bajo costo total.
Para una información más completa sobre cualquiera de estos productos, que representan ahorros, ganancias y mecanización en la industria azucarera, comuníquese con la oficina de Goodyear más cercana o escriba a: Goodyear International Corporation, Akron 16, Ohio, U.S.A.

Los Productos Goodyear se fabrican en: Alemania, Argentina, Australia, Brasil, Canadá, Colombia, Cuba, Escocia, Estados Unidos de América, Filipinas, India, Indonesia, Inglaterra, Irlanda, Japón, Luxemburgo, Méjico, Nueva Zelandia, Perú, Suecia, Unión Sudafricana, Venezuela—y se venden por medio de Representantes, Sucursales y Distribuidores en todo el mundo.

GOODYEAR

Sure-Grip, Compass—T. M.'s The Goodyear Tire & Rubber Company, Akron, Ohio, U. S. A.

los rumores:

Algunos almacenes dedicados a la venta de repuestos para tractor y componentes de los carriles, aseguran que sus piezas son fabricadas en Estados Unidos, Europa, el Canadá, o Latinoamérica, en talleres autorizados por Caterpillar, y que por consiguiente sus productos son de calidad Caterpillar.

la realidad:

- ¡Estas declaraciones son falsas!
- Algunos competidores fabrican repuestos PARECIDOS a los repuestos legítimos Cat, pero en realidad esas piezas distan mucho de ser iguales en calidad. La DIFERENCIA en calidad les pone en condición de poder vender a precios iguales o más bajos que los de los Distribuidores Caterpillar, pero no hay que dejarse engañar por las apariencias.
- Todas las piezas que Caterpillar adquiere de otras compañías, son sometidas a rigurosas pruebas para verificar su alta calidad.
- SOLAMENTE los Distribuidores Caterpillar tienen repuestos que incorporan las mejoras más recientes de ingeniería y fabricación.

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Caterpillar y Cat son Marcas Registradas de Caterpillar Tractor Co.

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UN PRODUCTO ACCO

ACCO UNIVERSAL

Eslingas de cadena para caña de azúcar y Cadena para fardos con gancho de cierre automático

Ud. puede acelerar el manejo de la caña, madera de pulpa y otros productos similares con la nueva y recia cadena ACCO para fardos. Su gran resistencia permite manejar sin peligro cargas excesivas. Su dispositivo perfeccionado de cierre evita que la cadena puede resbalar o soltarse una vez estirada o apretada alrededor del fardo.

Soltura instantánea — se obtiene con un solo golpe rápido sobre el gatillo empleando una barra o un martillo de mango largo.

Argollas ACCO finales enteramente soldadas completan la resistencia de esas eslingas para satisfacer las demandas severas de este servicio.

Sus costos de manutención son insignificantes. La superficie de la cadena es endurecida especialmente para resistir maltratos. La construcción compacta del gancho de cierre y su cuerpo sumamente fuerte permiten desafiar roturas ordinarias. Los resortes pueden cambiarse fácilmente dándole vuelta a un solo tornillo.

ACCO se mantiene a la vanguardia del progreso en la industria azucarera. Para más datos sobre las eslingas cañeras ACCO Universal y cadenas para fardos, escríbanos hoy mismo.

ACCO MR

AMERICAN CHAIN & CABLE COMPANY, INC.

Departamento de Exportación
230 Park Avenue, Nueva York 17, N. Y., E. U. A.

Mejor Calidad

92

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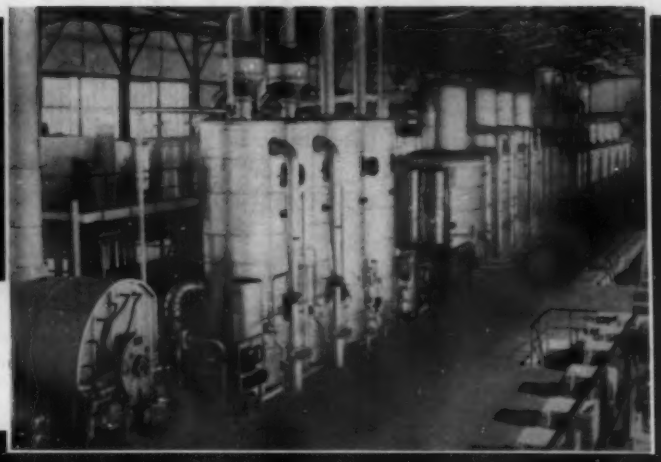
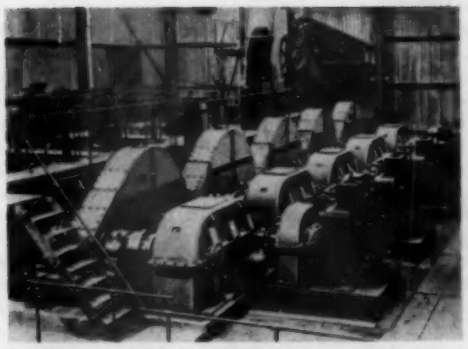


TODO

en su FÁBRICA DE AZÚCAR de caña o de remolacha

Planta de cincos molinos.
Central Azucarero Ureña (Venezuela)



Centrifugas completamente automáticas.
Fábrica de azúcar de Vauciennes (Francia)

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Extractos de Publicaciones Azucareras

Publicados bajos los Auspicios de la Sociedad Internacional de Tecnólogos Azucareros de Caña por Arreglo Especial con SUGAR y AZUCAR—Dr. O. W. Willcox, Redactor Técnico

Agronomía

Propagación Selectiva de la Caña de Azúcar para Aumentar Su Resistencia al Perforador del Cogollo (Scirophaga Nivella F.)

H. CHANG y C. V. SHIH, *Informe* de la Estación Experimental Azucarera de Formosa, No. 19, pp. 53-66; abstracto en español.

El hecho de que las variedades de caña caracterizadas por venas centrales fuertes y duras son resistentes al perforador del cogollo fue observado por Isaac en 1930 y de nuevo por Rao en la India en 1947. Esto se ha confirmado ahora mediante un amplio estudio llevado a cabo en Taiwan (Formosa). Esta resistencia la determinan dos factores estructurales susceptibles a heredarse: (1) el grosor de la epidermis superior e inferior de la vena central de la hoja de caña y, (2) la densidad (o número y diámetros) de las células parenquimatosas de la vena central. Estas dos características juntas confieren resistencia a los ataques del perforador. El coeficiente de correlación para el porcentaje de daño sufrido por las plantas es de alrededor de r = .8600.

■

Tratamiento con Mercurio de los Tallos de la Caña para Ayudar a la Germinación

S. O. SKINNER, *Proceedings*, Queensland Society of Sugar Cane Technologists, Vol. 26, pp. 85-87 (1959)

El tratamiento de los plantones de caña con una solución de mercurio para protegerlos contra la infección de la enfermedad de la piña es práctica reconocida, pero también tiene gran valor como medio de promover la germinación en casos donde la enfermedad no constituye un problema. Se recomienda el siguiente método: tres toneladas de caña destinada a la siembra se cargan sobre un camión. Al llegar al campo, el cargamente pasa por debajo de un pequeño rociador que humedece la caña con 12 a 15 galones de la solución durante un período de cinco minutos. La caña es entonces plantada según se acostumbra. En un ensayo en el cual cuatro hileras fueron tratadas y otras cuatro fueron dejadas sin tratar, los resultados fueron los que se indican en la tabla que se reproduce a continuación, la que da el número de trozos por cada 100 yardas de hilera:

Período Transcurrido Despues de Plantados	Hileras Tratadas	Hileras No Tratadas	Relación Aprox. de Mejoramiento
Tres semanas	167 retoños	36 retoños	4½ : 1
Cuatro semanas	295 retoños	106 retoños	3 : 1
Seis semanas	410 retoños	213 retoños	2 : 1
Siete semanas	418 retoños	219 retoños	2 : 1

Al final de siete semanas, las hileras no tratadas presentaban apenas la mitad de los retoños de las hileras tratadas, y aun esos retoños tenían un aspecto de desarrollo tardío, mientras que los de las hileras tratadas se encontraban en estado vigoroso y adelantado.

El procedimiento se simplifica cuando los trozos de caña de semilla se colocan en el surco por medio de una sembradora de caída, que está forrada con láminas de metal; la solución de mercurio se arroja libremente sobre los plantones, y el exceso de solución se recupera por medio de drenaje. La preparación de mercurio que se usa es cloruro de mercurio etoxi-etilo.

■

Efecto del Tratamiento Experimental con Hormonas Sobre el Enraizamiento de Trozos de Caña de Semilla

EDIERSON ERASMO DO AZEVEDO, *Brazil Azucarero*, Vol. 53, No. 1, pp. 16-24, 1955

Este libro contiene informes sobre dos experimentos, uno con ácido indolacético y el otro con ácido indolbutírico. El objeto de este trabajo fue determinar si las hormonas ejercerían algún efecto estimulante sobre la formación y desarrollo de raíces primarias en los nudos de los tallos. Las soluciones utilizadas eran de cuatro concentraciones: de 0.001 de gramo a 0.01 de gramo por 100 gramos de agua. La variedad utilizada fue la Campos Brazil 36-14. El método de operación consistía en empapar los trozos de tres nudos en las soluciones de hormonas durante períodos de 12 a 24 horas y luego plantarlos perpendicularmente en arena húmeda. Transcurridos cinco días, los trozos fueron extraídos cuidadosamente, lavados con un chorro de agua, clasificados como no enraizados, débiles, buenos o de enraizamiento óptimo, y luego replantados cuidadosamente en la misma arena. Después de seis meses los tallos fueron sacados de nuevo y limpiados de arena, y sus raíces fueron inspeccionadas otra vez. El enraizamiento de los trozos tratados con el ácido indolacético fue de 80 a 100% perfecto; el enraizamiento de los tratados con ácido indolbutírico fue apenas un 20%. La extensión del enraizado fue en proporción directa a la duración del humedecimiento y a la concentración de las hormonas. Es obvio que el ácido indolbutírico no es apropiado para este propósito.

■

Tecnología

Granulación de Masas de Baja Pureza por el Método de "Ceba Total"

SIR JOHN SAINT y J. G. H. BAILEY, *Memoria*, British West Indies Sugar Technologists, pág. 127 (1957).

El método de "ceba total" consiste en cebar la masacocida con un número de pequeños fragmentos de cristales de azúcar igual al número de cristales completamente desarrollados anticipados en la magma al estar lista para la purga. Según el Sr. Saint, la condición ideal es producir en la masacocida un tamaño regular de cristal de 0.35 de milímetro, cada uno con un peso de 0.048 de miligramo aproximadamente, a fin de obtener unos 10,000

cristales en 1 ml de masacocida terminada. Este método se viene empleando extensamente, y presenta las ventajas de mayor uniformidad del grano, mejor agotamiento de la meladura, rápido trabajo de los tachos y centrífugas y menos conglomeraciones. Para obtener el "cebo" o semilla, se muele azúcar puro en un molino de bolas en presencia de alcohol metílico o isopropílico. No obstante, hay gran diversidad en los tipos de molinos de bolas y en la cantidad de semilla empleada para la "ceba". Gillett, el inventor del método usaba 8 onzas de azúcar en polvo por cada 100 pies cúb. de masacocida; otros usaron 1 onza y aun 0.2 de onza por 100 pies cúb.

En un esfuerzo por normalizar el método de preparar la pasta de semilla, Bailey construyó un molino horizontal de bolas con un diámetro interior de 6¼ pulgs. por 7¾ pulgs. de largo, provisto de 2,500 bolas de acero de ⅜ de pulg. de diámetro, diseñado para girar a 60 rpm. Este molino se carga con 800 gramos de azúcar lavado y 2,200 ml de alcohol metilado. Los ensayos demostraron que al cabo de siete horas de molienda, la pasta contenía aproximadamente un billón de núcleos por gramos de azúcar lavado y 2,200 ml de alcohol metílico. Los se podían reproducir. Una carga del molino de bolas produce bastante "semilla" para 6,000 a 7,000 pies cúb. de masacocida "C".

Este método se usó durante toda una campaña con resultados "muy satisfactorios".

■

Valor Furfural del Bagazo de Caña de Azúcar

T. O. ELLIS, P. E. ROHRIG y G. ARCENEAUX, *Jamaican Association Sugar Technologists Journal*, Vol. 20, 1957, pp. 20-26

Pruebas de molienda, llevadas a cabo en Central Romona, de acuerdo con trabajos anteriores efectuados en Louisiana y Cuba, revelaron diferencias ta de gran significación en variedades, características que afectan el rendimiento de azúcar en el jugo primario. En general, estas características de variedad consistentes en valores para extracción normal de % caña y factores de reducción de sacarosa variaban inversamente con la fibra % caña. Excepciones a esta regla pueden atribuirse en parte a errores en los experimientos, pero hay evidencia que demuestra que la composición o naturaleza de la fibra de una variedad específica puede presentar en sí diferencias importantes.

Que las fibras de diferentes variedades pueden, de verdad, ser diferentes en naturaleza lo indica el descubrimiento de que variedades de contenido de fibra similares difieren marcadamente en contenido de furfural, que ahora se ha convertido en importante subproducto de la industria de caña de azúcar. Así es que, aunque el potencial del % de furfural de materias secas en el bagazo de la variedad P.O.J. 2878 es de unos 17.5% los potenciales de furfural de otras 19 variedades fueron encontrados entre 14,50 (Pinda) y 19% (B 43337). Es de suponerse que la composición de las fibras de estas cañas pueden diferir suficientemente como para tener un efecto considerable sobre la extracción del jugo.

■

Nuevo Sistema para Extraer el Azúcar de los Lodos del Filtro-Prensa

R. GOTTSCHALK, *Zucker*, Vol. 12, No. 13, pp. 301-305 (1959)

En un sistema perfeccionado por Walter Thron e instalado para ser aplicado en gran escala en una fábrica alemana de azúcar de remolacha, el jugo es alcalizado y carbonatado y entregado al primero de un tándem de tanques de sedimentación. El jugo claro procedente del decantador principal es enviado entonces a los evaporadores y el lodo pasa al próximo tanque

Evaporadores
Tachos al vacío
Condensadores
Cristalizadores
Receptáculos de Presión

Equipo significa producción —la producción que significa utilidades. Podría ser cuestión de $000,000 . . . o de millones Para asegurar que pueda comenzar producción a tiempo, pida lo que necesite a St. Mary Iron Works. Desde 1900, St. Mary ha suministrado equipo digno de confianza a la industria azucarera, ¡entregándolo a tiempo! Si usted está en proceso de reubicar su plant , de renovarla o ampliarla, pueda acudir a St. Mary . . . sea para obtener una planta completa o una sola pieza. Para detalles, completos, escriba o telegrafíe.

Diseñadores
Ingenieros
Fabricantes
Constructores

durante medio siglo

ST. MARY IRON WORKS INC.
FRANKLIN, LOUISIANA - U. S. A.

en todo el mundo

de sedimentación, que es de menor tamaño. El jugo claro procedente de este tanque es devuelto al tanque principal, en tanto que el segundo lodo pasa a un tercer tanque, aun más pequeño, y así sucesivamente hasta el sexto tanque. En este punto el lodo concentrado se encuentra con una corriente contraria de agua de condensación; el lodo procedente de este sexto tanque es extraído a bombeo, y el jugo claro es devuelto al quinto tanque, y así sucesivamente hasta llegar al tanque principal. En efecto, este sistema es igual, en principio, a lo que ocurre en una batería de difusión, en que los cossettes de la remolacha se mueven contra una corriente de agua dulce. La operación se hace automática por medio de un sistema de membranas, válvulas Venturi, medidores de flujo y bombas, y depende de las diferencias entre las gravedades específicas del jugo claro y del lodo en las distintas etapas.

Según el autor, la administración de la fábrica quedó muy satisfecha con los resultados. El repetido lavado a que se somete el lodo no aumenta el contenido de sales de cal en el jugo ni afecta su pureza. Hay un pequeño aumento en la cantidad de agua a ser evaporada, pero esto se compensa con otras ventajas, especialmente por el hecho de que se puede prescindir del filtro rotativo. El costo de instalación de este sistema es sólo un 63% del costo de un filtro rotativo equivalente, y el costo de su bomba al vacío y del consumo de fuerza es sólo una quinta parte. Se economiza el gasto por concepto de paños de filtro y otros servicios de mantenimiento.

■

El Uso de Jugo Claro o Agua Para Derretir Azúcar

S. P. SANYL, *International Sugar Journal*, Vol. 57, pp. 80, 81 (1959)

En la fabricación de azúcar blanco de plantación, es necesario re-derretir una cantidad considerable de masa cocida de bajo grado en jugo claro o en agua clara; existe mucha confusión respecto a los méritos relativos de estos dos disolventes. Desde el punto de vista funcional, el uso de jugo claro ofrece ciertas conveniencias, pero éstas son contrapesadas por algunas desventajas. Cálculos del verdadero consumo de vapor en los dos procesos demuestran que la economía de vapor que resulta del uso del jugo claro es de sólo unos 0.39%, la cual es demasiado insignificante para tenerse en cuenta a la luz de otras circunstancias. En primer lugar, no es deseable derretir el azúcar en jugo claro debido a que toda la tubería que conduce el jugo claro se encuentra siempre llena de jugo deteriorado, especialmente cuando la tubería es larga y el proceso de derretimiento es interrumpido por cualquier razón. La segunda objeción radica en que, cuando el derretido se mezcla con el jugo claro y es enviado al evaporador, inevitablemente tiene que haber alguna pérdida desconocida, por cuanto el derretido es siempre ácido y la temperatura de ebullición en el primer cuerpo del cuadruple es bastante alta. En algunas fábricas que siguen un sistema de cuatro masas cocidas, son derretidos los azúcares ya curados C & D. En este caso, el consumo de vapor es casi el doble.

■

Indicaciones para Aumentar la Capacidad de Molienda y Reducir los Costos

A. B. CHIRGWIN, ante la *Asociación de Técnicos Azucareros de Cuba*, Octubre 1958

Muchos trenes de molienda van precedidos de un solo juego de cuchillas de gran separación que solamente preparan la caña parcialmente. Algunos ingenios han instalado un segundo juego de cuchillas con ¾″ de separación, o sea lo suficiente para que no toquen el transportador de caña. El resultado ha sido mayor capacidad y más alta extracción. Las cuchillas de poca separación preparan la caña tan bien como una desfibradora, y cuestan menos, consumen menos fuerza y su conservación resulta más económica.

Se introdujo un nuevo separador de fragmentos de hierro, el cual consta de una polea magnetizada sobre la que corre una banda de caucho a alta velocidad para esparcir el colchón de caña, lo que atrae los fragmentos de hierro al campo magnético. Esto reduce en alto grado el riesgo de costosos daños a las mazas del tándem.

Los transportadores intermedios tipo de cadena y tablillas pueden implicar fuertes costos de conservación, cuya posibilidad ha sido reducida en alto grado por el desarrollo de transportadores provistos de bandas o esteras de caucho. Aparte del menor costo de conservación, los transportadores con bandas de caucho reducen al mínimo los derrames de jugo y bagazo. También retienen mejor el agua de imbibición, lo que hace tal proceso más efectivo. Aparte de lo anterior, estos transportadores poseen mayor fuerza de alimentación que los tipos de tablillas, y cuando se usan con rodillos de alimentación forzada, se aumenta la capacidad de los molinos.

La introducción de embragues neumáticos para regular los transportadores intermedios ha facilitado el funcionamiento del tándem. Éstos reducen las costosas averías, y cuando se combinan con el tren de engranajes del tándem, hacen que las turbinas a vapor puedan transmitir toda su fuerza, lo que a la vez aumenta la capacidad del tren de molienda.

La U. S. Steel Diseña y Suministra Almacenes Económicos para Azúcar a Granel Conforme a Especificaciones del Comprador

Los diseños basados en la experiencia de la U. S. Steel y necesidades del comprador elevan la eficiencia en almacenes de azúcar a granel. La rígida construcción de la armazón (a la izquierda) elimina los soportes interiores y permite utilizar el piso plenamente. El diseño especial de los pares en tres secciones hace que se puedan armar rápidamente y facilitan los embarques por mar; hace que la armazón pueda resistir vientos ciclónicos hasta 150 millas por hora. Además, las estructuras de acero ofrecen las siguientes ventajas: protección contra incendios, mayor duración y menos gastos de conservación. Para datas sobre las economías dables por los almacenes de acero, escriba a: 100 Church Street, Nueva York 8, N. Y., E.U.A.

USS United States Steel Export Company

TRADEMARK

Remolachera en Pakistán

(*Viene de la página* 52)

lacha fue de un promedio de 14.67%, con un máximo de 17.00%.

El combustible para la elaboración de la remolacha lo proporcionó el bagazo dejado por la cosecha de caña, suplementado por 60,000 galones de petróleo.

Las perspectivas futuras para una industria combinada de remolacha y caña en el Norte del Pakistan Occdiental son alentadoras. Una valiosa expereincia de su cultivo y elaboración se está obteniendo en Charsadda. Maquinaria para la elaboración de la remolacha, principalmente equipos de difusión, será instalada dentro de poco en otros ingenios ya existentes en esta área, lo que podria contribuir a aliviar grandemente la situación del suministro de azúcar blanca en Pakistán.

■

Aprueban Vasto Proyecto de Riego

El gobierno de Africa del Sur ha aprobado el proyecto de riego de Pongolapoort-Makatini Flats, que significa la utilización de los recursos de agua del rio Pongloola para el riego de la caña de azúcar en Zululandia, al este de las montañas de Lebombo. Los trabajos darán comienzo este año y estarán terminados para 1976, siendo éstos los mayores en su clase que jamás se hayan emprendido en la Unión y estimándose su costo en 87 millones de libras esterlinas. Se planea poner bajo riego 64,000 acres de tierra sembrada de caña, la que se calcula producirá 560,000 toneladas de azúcar anualmente.

■

El Primer Año Estatal en Hawaii

La posición actual y futuras perspectivas para las condiciones de negocio, el desarrollo urbano y las potencialidades agrícolas y económicas en Hawai, fueron analizadas por el Dr. James H. Shoemaker durante un almuerzo en el Advertising Club el 19 de Agosto en la ciudad de Nueva York.

El Dr. Shoemaker es el primer economísta de Hawai, vicepresidente del Banco de Hawai y ex profesor de Economía en Harvard. Aunque la discusión abarcó todas las fases de la actividad industrial en Hawai, se dieron algunas cifras particularmente interesantes en cuanto a la posición relativa de la industria azucarera. Por ejemplo, la azúcar está aun en primer lugar entre las actividades productoras de ingresos de las Islas, siendo el valor de la producción de 1959 de $130,998,000. Normalmente este valor hubiera sido del orden de los $145,000,000, pero la zafra azucarera aun sufre los efectos de la desastrosa huelga de 1959. Estas cifras se pueden comparar con el valor de la cosecha de piña que fué de $127,000,000, asi como con el de todas las otras actividades agrícolas, incluyendo la ganaderia, o sea $43,374,000. El gasto que hacen los turistas en Hawai, otra fuente importante de ingresos en las Islas fue de $109,000,000.

Se calcula que la población total en las Islas es de 621,495 personas de las cuales 14,036 están empleadas en la industria azucarera; el 64% en trabajos de campo, el 25% en los ingenios y el 11% en tareas administrativas. El área total de las Islas es de 4,118,400 acres, de los cuales el 80% es inapropiado para la agricultura intensiva.

Durante el pasado año el promedio de crecimiento económico en Hawai ha sido aproximadamente de un 10%. El Dr. Shoemaker prevée un continuado y saludable desarrollo, aunque a un promedio algo más bajo que el 10% anual.

Aparentemente, la industria azucarera se va aproximando gradualmente a su nivel maximo de producción, pero se espera que tal vez pueda desarrollar nuevos sub-productos.

Nueva Válvula de Compuerta que Reduce los Costos de Reemplazo

Fabricada con Cuñas Sólidas para Resistir la Abrasión . . .
Fabricada con Bronce para Resistir la Corrosión

Las nuevas válvulas de compuerta R-P&C están fabricadas de acuerdo con las más altas normas de ingeniería para resolver los problemas especiales de válvulas en la industria azucarera. Estas válvulas tienen cuñas sólidas y paredes extra-gruesas para hacerlas excepcionalmente fuertes y extraordinariamente resistentes a la acción abrasiva de los flúidos. El bronce empleado en las válvulas R-P&C es una aleación de metales de alta calidad, extremadamente resistente a los efectos corrosivos de los ácidos del azúcar en las tuberías.

La durabilidad y resistencia a la corrosión de estas válvulas pueden evitar interrupciones en la producción, y reducen los costos de manutención y reemplazo. Visite a su distribuidor hoy mismo y cerciórese cómo las válvulas de compuerta R-P&C en bronce pueden ahorrarle dinero.

R-P&C abarca un surtido completo de válvulas de compuerta, de globo, angulares y de retención fabricadas en bronce, hierro fundido o forjado en una amplia variedad de tamaños y estilos . . . y para toda clase de presiones. Además R-P&C ofrece productos especiales como válvulas de compuerta Lubrotite, grifos con prensaestopas de asbesto, accesorios de acero fundido y válvulas de acero fundido de cierre sellado a presión. Escriba a la dirección de abajo para más informes.

AMERICAN CHAIN & CABLE
DIVISION DE VALVULAS R-P&C
Departamento de Exportación
230 Park Ave., Nueva York 17, N. Y., E.U.A.

Como Aumentar la Capacidad

(Viene de la página 56)

la turbina de vapor es el mejor reemplazo de la antigua máquina a vapor tipo pistón.

Durabilidad y Resistencia

El desgaste y la resistencia también imponen una seria limitación al aumento de capacidad. Debido a las grandes cargas de bagazo (altura y densidad), tensiones altas e instantáneas pueden producirse en los molinos, especialmente si el sistema hidráulico que controla el levante del rodillo superior no trabaja con suficiente rapidez (tuberías de pequeño diámetro, fricción, etc.) La tensión y desgaste en los ejes, engranajes y muñones son también acentuados. Por esta razón, la generalización es imposible, ya que las condiciones son distintas en cada caso, dependiendo del diseño, edad, fabricación, etc. En cada caso se debe hacer un cuidadoso estudio, con la posible ayuda del fabricante del molino.

Resultados Obtenidos En Usina Sta. Lydia

La Usina Sta. Lydia, en Ribeirao Preto, en Brasil, tiene la siguiente maquinaria:

Fabricante de molinos: Die. Fives-Lille, Francia, 1947

Número total de molinos — 4

Número total de rodillos — 12

Dimensiones: 0 = 530 mm, l = 1010 mm

Mando: una máquina Corliss de 350 caballos de fuerza

Hasta 1956 tuvimos las siguientes características: n = 4.3 rpm;

Bagazo Final { 3.6% azúcar / 45.0% humedad

Rayado 1 x ½″ en el primer molino (desmenuzadora), ¾″ en los otros. Angulo de rayado: 55°.

Rayado en forma de "cheurones": en todos los rodillos superiores y de alimentación.

Rayado "Messchaert": ninguno.

Preparación de la caña: 1 juego de cuchillas, motor de 160 caballos de fuerza a media potencia.

Capacidad de molienda: (Promedio 24h, 12% fibra) 23 toneladas/h. Las siguientes modificaciones fueron introducidas y observados estos resultados:

1956

Número de rodillos de alimentación: 1 (en el último molino).

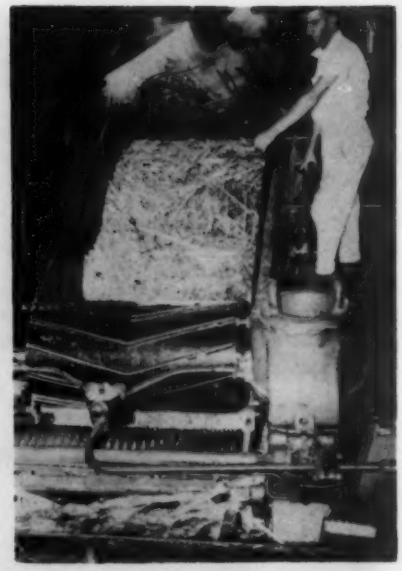
Capacidad aumentada a: 26 toneladas/h.

1957

n = 4.5 rpm

Número de rodillos de alimentación: 3 (en los últimos tres rodillos).

Capacidad aumentada a: 31 toneladas/h.



Alimentando la desmenuzadora (Primer Molino) en el nuevo proceso.

1958

n = 4.75 rpm

Rayado "Messchaert": en el rodillo alimentador del cuarto molino.

Capacidad aumentada a: 34 toneladas/h.

1959

Aquí se hicieron las principales modificaciones. El sistema ilustrado en la Fig. 5 fue adaptado para alimentar a la desmenuzadora, en lugar de la antigua y alta canal inclinada. Otras modificaciones fueron las siguientes:

n = 5 rpm (límite de velocidad de nuestro motor).

Preparación de la caña: 2 juegos de cuchillas, impulsados por la misma máquina a vapor de 160 caballos de fuerza, trabajando a plena potencia.

Rayado: 1 x ½″ en los rodillos superior y de descarga del primer molino y en todos los rodillos de alimentación.

¾″ en los rodillos superiores y de descarga de los últimos tres molinos.

Número de rodillos de alimentación: 4 (incluyendo la desmenuzadora, según se ve en la Fig. 5.)

Bagazo final: 3.7% azúcar—47% humedad.

Capacidad: aumentada a 42 toneladas/h.

Durante el año 1960 usaremos rayado "Messchaert" en todos los rodillos de alimentación, y para 1961 proyectamos cambiar nuestra máquina de pistón por una turbina a vapor, lo que podría aumentar *n* a 6 rpm.

ADVERTISERS' INDEX

October, 1960

American Air Compressor Corp. 48
American Chain & Cable Co. 78; 83
American Factors Associates, Ltd. . . . 46; 78
ASEA 20
Atlas Powder Company, Darco Dept. . . . 15
Bethlehem Steel Export Corp. 65
Brill Equipment Company 48
Broadbent, Thomas, & Sons Ltd. 9; 50
Broussard Machine Company 7
Buttner-Werke 59
Caterpillar Tractor Company 77
Chain Belt Company 30
Combustion Engineering, Inc. 62
Crofts (Engineers) Ltd. 14
Cutler-Hammer, Inc. 60; 61
de la Roza Corporation 41
De Laval Steam Turbine Company 72
Diamond Alkali Inter-American Corp. . . . 64
Dicalite Div., Great Lakes Carbon Corp. . . . . Outside Back Cover
Dorr-Oliver Incorporated 1
Dow Chemical Inter-American Limited . . . 63
Eagle-Picher, The, Company 18; 68
Ewart Chainbelt Co. Ltd. 48
Falk, The, Corporation 22
Farrel-Birminghan, The, Company 17
Fas-Flo Filter Corporation 16
Fives Lille-Cail 79
Fletcher, George, & Co. Ltd. 32; 55
Fly Ash Arrester Corporation 47
Fontaine & Co. GmbH 78
Fulton Iron Works Company 21
Geigy Agricultural Chemicals . Inside Back Cover
Gelb, R., & Sons, Inc. 48
General American Transportation Corp. . . 31
General Electric Co., Locomotive & Car Equipment Dept. 9
Goka N.V. Machine Works 8
Goodyear International Corp. . . 73-74-75-76
Hampden Estates Ltd. 49
Heat & Power Co., inc. 48
Henderson, John M., & Co. Ltd. 11
Hough, The Frank G., Company 66
J & L Engineering Co., Inc. 5
Jeffrey Manufacturing Co. 67
Johns-Manville Corp. 27
Leffingwell, Roy J. 49
Link-Belt Company 12
Lunkenheimer, The, Company . Inside Front Cover
Masson, E. C. 48
Minneapolis-Honeywell 71
Mirrlees Watson, The Co. Ltd. 26
Norit 45; 70
Perkins, Logan 48
Rose, E. A., Inc. 48
St. Mary Iron Works, Inc. 81
Silver Engineering Works 19
Smith, A. & W., & Co. Ltd. 57
Squier, The, Corporation 13
Stanhope, R. C., Inc. 48
Stein Equipment Company 48
Stork-Hengelo 28
United States Steel Export Co. 82
Wabash Power Equipment Co. 48
Watson Laidlaw, & Co. Ltd. 11
Weaver, Charles, Inc. 48
Western, The, States Machine Co. 3
Westinghouse Electric International Co. . 24; 25
Worthington Corporation 29
Wyandotte Chemicals Corporation 23

Simazine

Nuevas perspectivas en la lucha contra las malas hierbas

Un solo tratamiento en pre-emergencia mantiene a las jóvenes plantas de Caña de azúcar libres de malas hierbas durante meses.

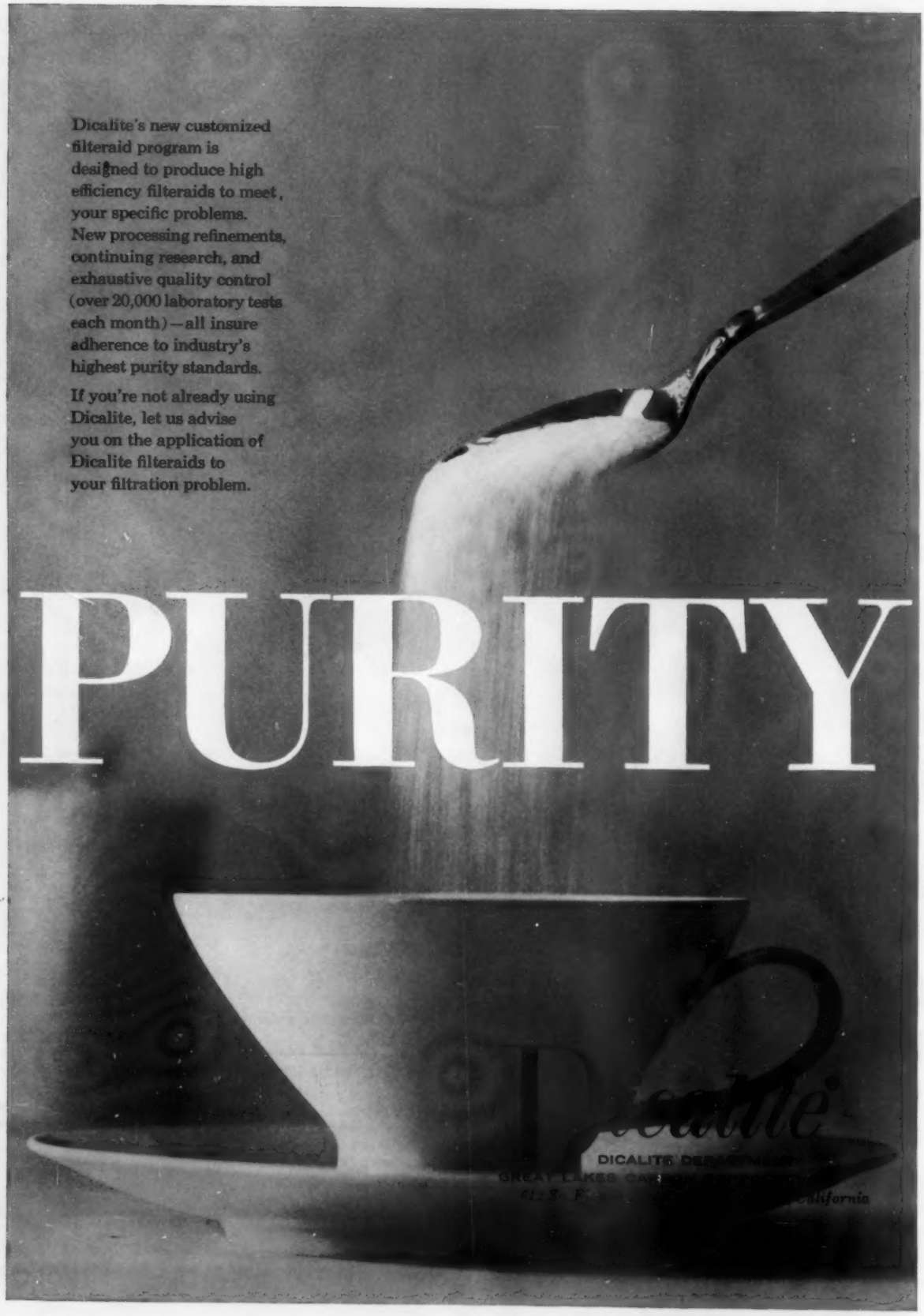
persistencia selectividad seguridad

Los herbicidas a base de Simazine, selectivos para la Caña de azúcar, se expenden:

En los Estados Unidos y en Puerto Rico, por los distribuidores de Geigy Agricultural Chemicals, Ardsley, N.Y., como **Geigy Simazine 80 W**

En América Central, América del Sur, Cuba, Haití, República Dominicana, Africa del Sur, Filipinas y Formosa, por los distribuidores de J. R. Geigy S. A., Basilea (Suiza), como **Gesatop 50 M**

En los paises del "Commonwealth" (excepto Australia) a través de Fisons Chemicals (Export) Ltda, 95, Wigmore Street, London W1, como **Simazine 50W**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